

AD-A098 986

TETRA TECH INC PASADENA CA

F/6 13/10

COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

DACW57-78-C-0028

UNCLASSIFIED

TETRAT-TC-3925-APP-B-K

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1 of 3

AD-A098 986



LEVEL III

①

COLUMBIA RIVER ENTRANCE
CHANNEL DEEP-DRAFT VESSEL
MOTION STUDY

FINAL REPORT

AD A098986

APPENDICES B, C, D, E, F, G, H, I, J, K

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SEPTEMBER 1980

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TETRA TECH

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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20. KEY WORDS (Continue on reverse side if necessary and identify by block number)		
Ship Motion, Water Wave Action on Ships, Approach Channels, Entrance Channels, Columbia River.		
21. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
A prototype ship motion monitoring program was initiated by the Portland District, U.S. Army Corps of Engineers to provide design criteria for the entrance channel at the mouth of the Columbia River. The contractor's field team boarded deep draft vessels bound to or from the Columbia River and measured vertical acceler- ation (heave), pitch, roll, yaw, and position as the vessels transited the 5-mile entrance channel. Twenty-nine vessels were monitored in the period May 1978- March 1979, and twenty-four in the period October 1979-April 1980.		

(OVER)

The final report details the field work data reduction processes, analyses, and results. The raw data is used to calculate vertical motions at the bow, stern, and side of the vessel, and the horizontal motion as the ship transits the entrance. This information is evaluated with respect to environmental conditions and the channel. Results of statistical analyses are shown for characteristics of individual transits, and long-range entrance usage.

Appendices A-K contain the tabulated and plotted motion data, environmental conditions, ship motion variables, and other information collected.

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APPENDIX B
INSTRUMENTATION SPECIFICATIONS

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QANTEX TAPE DRIVE SPECIFICATIONS

MEDIUM..... 3M DC 300A Data Cartridge

COMMANDS..... Write, Write Tape Mark, Erase, Read Forward, Read Reverse, Space Block Forward, Space Block Reverse, Space File Forward, Space File Reverse, Rewind, Unload and Eject.

COMMAND CHAINING.... Available for Read and Space Block Commands

DENSITY..... 1600 bpi, phase-encoded

TRANSFER RATE..... 6000 bytes per second at 30 inches per second

READ-WRITE SPEED.... 30 inches per second

REWIND & SEARCH
SPEED..... 90 inches per second

COMPATIBILITY..... ANSI & ECMA Standards

HEAD TYPE..... 4 track Read-After-Write

POWER..... 110V/60Hz or 105-235V/40-440Hz (Option 01)

SIZE..... 21"x17"x7½"

WEIGHT..... 29 lbs. (2710-1D), 34 lbs (2710-2D)

DATA CHECK..... Cyclic Redundancy Check Character

SPECIFICATIONS

01.0 GIMBAL FREEDOM
 1.1 INNER GIMBAL ±86° MINIMUM
 1.2 OUTER GIMBAL ±60° CONTINUOUS
 2.0 OUTPUT TAW
 2.1 PICKOFF POTENTIOMETER
 2.1.1 RESISTANCE 5000 OHMS ±10%
 2.1.2 POWER DISSIPATION 0.5 WATTS MAXIMUM
 3.0 SPIN MOTOR
 3.1 VOLTAGE 115 VAC ±10%, 400 HZ ±5%, 1 PHASE
 3.2 CURRENT 100 MA MAXIMUM STARTING, 65 MA MAXIMUM RUNNING
 3.3 TIME TO SPEED 2 MINUTES NOMINAL WITH 80% OF RATED VOLTAGE APPLIED
 4.0 PRECISION
 4.1 CURRENT 100 MA NOMINAL, INTERMITTENT INTERNALLY CONNECTED WITH MOTOR
 4.5.0 DRIFT
 4.5.1 SCORBY NOT MORE THAN 10"/HOUR (SCORBY DEFINED AS ALTERNATE CLOCKWISE AND COUNTERCLOCKWISE 27.5° ROLL, PITCH, AND YAW MOVEMENTS AT 6.0 CYCLES PER MINUTE)
 4.5.2 HEADING OUTPUT TO 0 - 359° ±1° (NON-SHORTING GAP IN POTENTIOMETER 1.0° TO 2.0°)
 4.6.0 INSULATION RESISTANCE 20 MEGOHMS, ELECTRICAL CIRCUITS TO CASE WITH 500 VDC APPLIED

7.0 ENVIRONMENTAL SPECIFICATIONS
 7.1 TEMPERATURE -60°F TO +165°F
 7.2 ALTITUDE -1000 FEET TO +40,000 FEET
 7.3 VIBRATION 5 TO 500 HZ, 0.036 INCH D.A. OR 5G WHICHEVER IS THE LIMITING VALUE
 7.4 HUMIDITY 0 - 95% RELATIVE HUMIDITY AT 90°F
 7.5 SEALING "O" RING, SEALED
 8.0 REMARKS
 8.1 ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.
 8.2 INSTRUMENT WEIGHT 3.5 LBS.



Electro-Mechanical
 Instruments

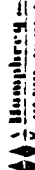
TITLE DEVELOPING DYNAMIC GYROSCOPE ON MOUNTING BASE		REV
DATE	0604-0901-1	REV
BY	C	REV
CHECKED BY	DATE	REV

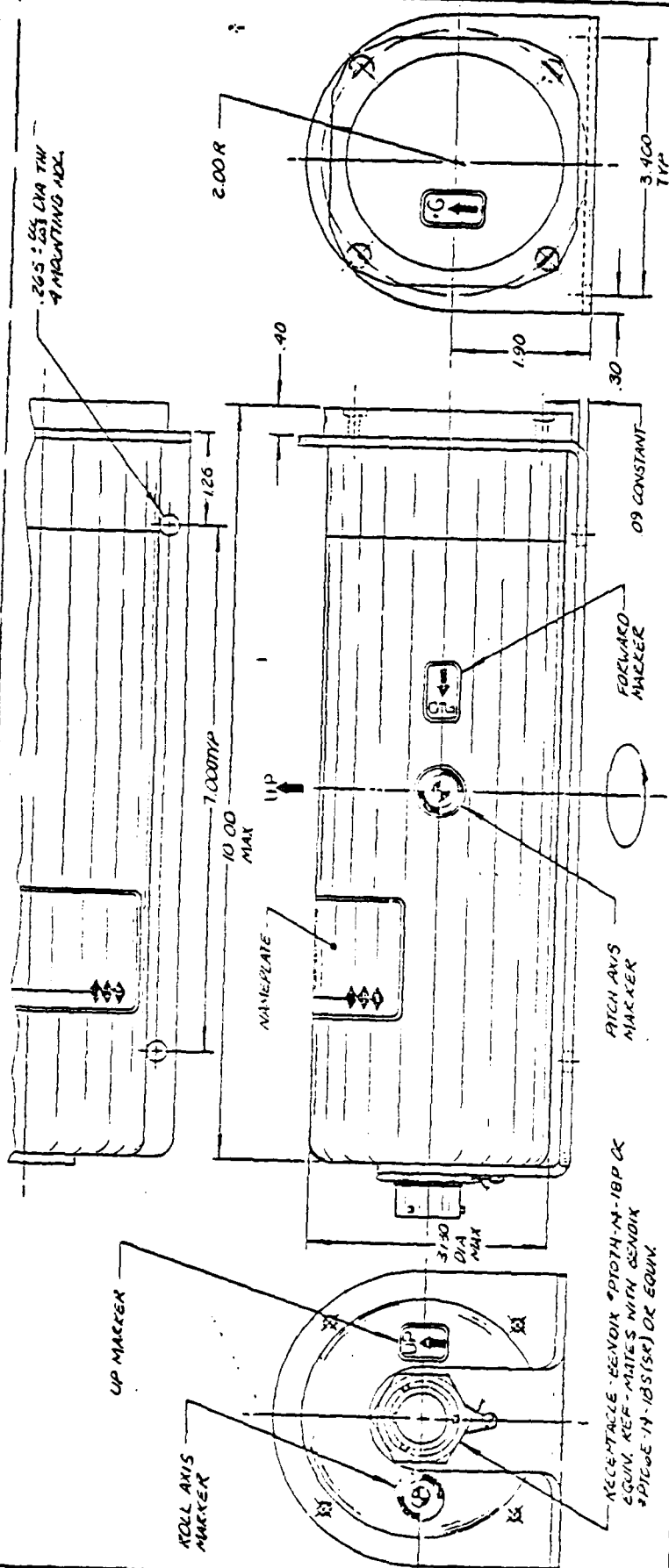
1.0	MECHANICAL LIMITS	85° MINIMUM FREEDOM OF ROTATION ABOUT PITCH AXIS, 360° ABOUT ROLL AXIS
2.0	OUTPUT	POTENTIAL/UNIT OUTPUT PROPORTIONAL TO ANGULAR DISPLACEMENT ABOUT THE ROLL AND PITCH AXIS.
2.1	PICKOFF	
2.2	ROLL ELECTRICAL DISPLACEMENT	150° 12"
2.3	PITCH ELECTRICAL DISPLACEMENT	150° 12"
2.4	RESISTANCE	5,000 15% OHMS
2.5	RESOLUTION	0.2° MAXIMUM
2.6	LINEARITY	0.5% OF FULL RANGE
2.7	POWER DISSIPATION	0.5 WATTS
2.8	CONTACT RESISTANCE	200 OHMS EQUIVALENT CONTACT RESISTANCE PER M.A.S. 710
3.0	ELECTRICAL REQUIREMENTS	3L VOLT +20%
6.0	ENVIRONMENTAL	0°F TO +120°F
6.1	TEMPERATURE	-1,000 TO 40,000 FT.
6.2	ALTITUDE	
6.3	VIBRATION	5 TO 500 HZ AT 0.016 G.A. ON 5G WHICHEVER IS LESS
6.4	SHOCK	20G ALL AXES TO 1 MS
6.5	INSULATION RESISTANCE	20 MEGOHMS AT 50 VDC BETWEEN ISOLATED CIRCUITS AND CASE
6.6	FINISH	MOUNTING BASE (BLACK EPoxy), CASE (BLACK ANODIZED), AND MOUNTING PLATE (STAINLESS STEEL)
6.7	WEIGHT	5 POUNDS MAXIMUM
6.8	SERVICE LIFE	500 HOURS
7.0	REMARKS	
7.1		ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.

ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.

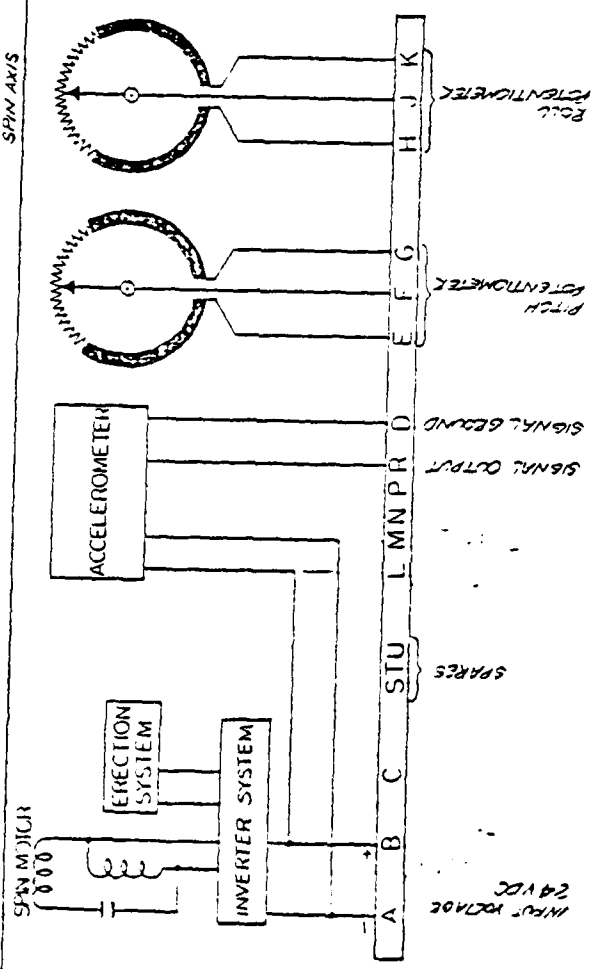
SPECIFICATIONS

4.1.0	MECHANICAL LIMITS	±85° MINIMUM FREEDOM OF ROTATION ABOUT PITCH AXIS, 360° ABOUT ROLL AXIS	6.0	ENVIRONMENTAL
2.0	OUTPUT		6.1	TEMPERATURE
2.1	PICKOFF	POTENTIOMETER OUTPUT PROPORTIONAL TO ANGULAR DISPLACEMENT ABOUT THE ROLL AND PITCH AXIS.	6.2	ALTITUDE
2.2	ROLL ELECTRICAL DISPLACEMENT	±50° ±2"	6.3	VIBRATION
2.3	PITCH ELECTRICAL DISPLACEMENT	±50° ±2"	6.4	SHOCK
2.4	RESISTANCE	5,000 ±5% OHMS	6.5	INSULATION RESISTANCE
2.5	RESOLUTION	0.2° MAXIMUM	6.6	FINISH
2.6	LINEARITY	0.5% OF FULL RANGE	6.7	WEIGHT
2.7	POWER DISSIPATION	0.5 WATTS	6.8	SERVICE LIFE
2.8	CONTACT RESISTANCE	200 OHMS EQUIVALENT CONTACT RESISTANCE PER M.A.S. 710	7.0	REMARKS
3.0	ELECTRICAL REQUIREMENTS		7.1	ITEMS MARKED WITH (*) ARE CHECKED IN PRODUCTION TESTS. OTHER ITEMS FOR REFERENCE MAY BE CHECKED ON ORDER BY QUALIFICATION TESTS.
3.1	VOLTAGE	24 VDC ±5%		
3.2	CURRENT	1.5 AMP NOMINAL		
4.0	SPIN MOTOR AND ERECTION SYSTEM THROUGH INTERNAL INVERTER			
4.1	VOLTAGE	115 VAC, 400 HZ, SINGLE PHASE		
4.2	CURRENT (RUNNING)	110 MA NOMINAL		
4.3	CURRENT (STARTING)	350 MA NOMINAL		
4.4	TIME TO SPEED	3 MINUTES MAXIMUM		
4.5	ERECTION RATES			
4.5.1	TIME TO ERECT	3 MINUTES MAXIMUM TO WITHIN 1.0° OF VERTICAL AFTER POWER IS APPLIED UNDER STATIC CONDITIONS. 6 MIN. DYNAMIC CONDITIONS.		
4.5.2	NOMINAL ERECTION RATE	ROLL 7°/MIN. PITCH 7°/MIN.		
4.5.3	VERTICAL ACCURACY	±0.2° OF TRUE VERTICAL		
5.0	ACCELEROMETER			
5.1	RANGE	±2.0G		
5.2	INPUT	24 VDC FROM INPUT VOLTAGE (INTERNALLY REGULATED)		
5.3	OUTPUT SENSITIVITY	2.50V/G		
5.4	ACCURACY (INCLUDING HYSTERESIS AND REPEATABILITY)	±0.1% OF FULL SCALE		
5.5	SELF TEST	CURRENT TORQUING CAPABILITY FOR CALIBRATION CHECK.		

 Humphrey ELECTRONICS AND INSTRUMENTS		MODEL NO. C	PART NO. 5403 C201-1
THE HUMPHREY COMPANY 1000 N. 10TH ST. MILWAUKEE, WIS. 53233		SHEET 2 OF 2	



NOTE:
 1. NAMEPLATE AND ALL MARKERS .010 MAX THICKNESS
 2. CW MOVEMENT OF INSTRUMENT WHILE VIEWING PITCH AXIS MARKER, WILL RESULT IN A DECREASING RESISTANCE BETWEEN PINS F & G
 3. CW MOVEMENT OF INSTRUMENT WHILE VIEWING ROLL AXIS MARKER WILL RESULT IN A DECREASING RESISTANCE BETWEEN PINS H & J



Humphrey		ELECTRIC MECHANICAL INSTRUMENTS	
DATE	BY	DATE	BY
1964	1	1964	1
1965	2	1965	2
1966	3	1966	3
1967	4	1967	4
1968	5	1968	5
1969	6	1969	6
1970	7	1970	7
1971	8	1971	8
1972	9	1972	9
1973	10	1973	10
1974	11	1974	11
1975	12	1975	12
1976	13	1976	13
1977	14	1977	14
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1979	16	1979	16
1980	17	1980	17
1981	18	1981	18
1982	19	1982	19
1983	20	1983	20
1984	21	1984	21
1985	22	1985	22
1986	23	1986	23
1987	24	1987	24
1988	25	1988	25
1989	26	1989	26
1990	27	1990	27
1991	28	1991	28
1992	29	1992	29
1993	30	1993	30
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1995	32	1995	32
1996	33	1996	33
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2005	42	2005	42
2006	43	2006	43
2007	44	2007	44
2008	45	2008	45
2009	46	2009	46
2010	47	2010	47
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2012	49	2012	49
2013	50	2013	50
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2220	257	2220	257
2221	258	2221	258
2222	259	2222	259
2223	260	2223	260
2224	261	2224	261
2225	262	2225	262
2226	263	2226	263
2227	264	2227	264
2228	265	2228	265
2229			

APPENDIX C
SAMPLE DATA SHEET FROM VOYAGE NO. 9

Voyage 9

Recorder C

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VOYAGE NO. 9

I. VOYAGE DESCRIPTION

Route: From Willapa Bay To Richmond

Dates: Depart 1515 3 Nov/28 Arrive 2345 5 Nov.

Time Zone Description PST (2D+8)

Tt Personnel Capt. L. J. Johnson Chris Butcher

II. VESSEL DESCRIPTION

Name CHEVRON WASHINGTON Type Oil Carrier

Captain Steve Alexander LBP 625'0"

LOA 651'4" Breadth (Molded) 96'0"

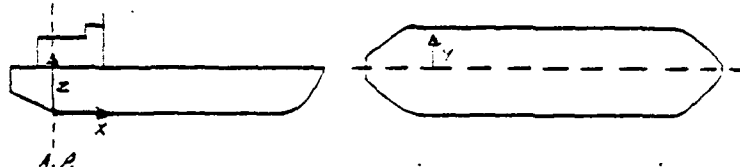
Draft: Fwd 23'0"

Aft 30'0"

Mean 28'6"

Displacement 36,385 LT

III. CG AND SENSOR LOCATIONS



Motion Sensor

Mini Ranger R/T

Fathometer Transducer

LCB (from Hydrostat Data)

LCG (computed)

VCG (computed)

X	Y	Z	COMMENTS
103.4'	+3.25'	100.7'	on center - 343
93.8'	+1.25'	123.5'	on deck railing on 1st Deck - on radar mast
596'	-	-	Transducer near bow
324.4'	-	-	
313.9	-	-	
-	-	22.6	

IV. BAR CROSSING

Date 4 November 1928

Time 0856 - 0919

Bar Pilot Capt. K. H. Johnson (Jr.)

Pilot's Opinion of Crossing E 25V

Voyage 9
Recorder C
Page 2/10

TRANSIT LOG

Begin 0356 4 NOV/20 End 0919

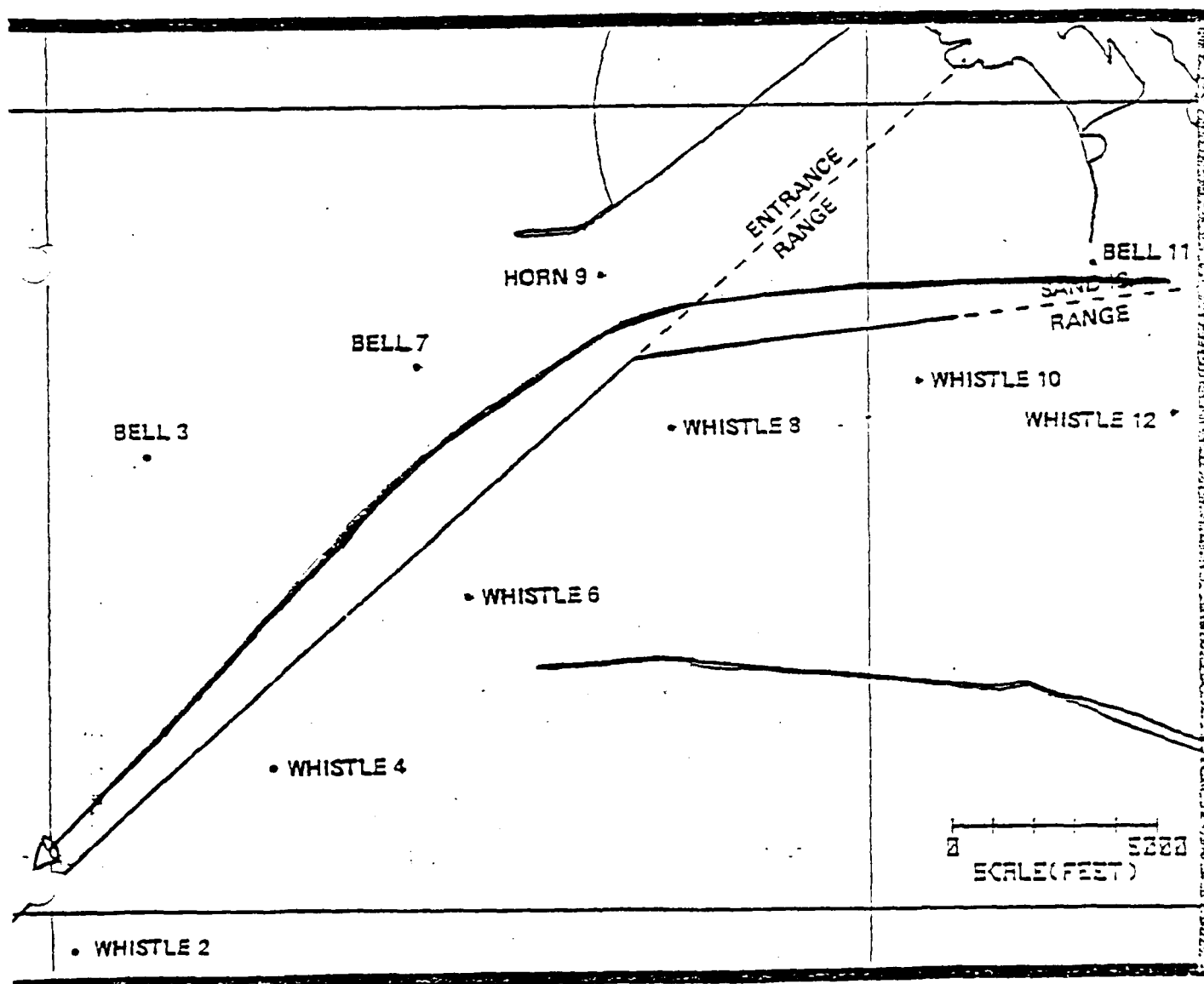
Bar Pilot Capt K. Mc ALPIN (No. 11) Opinion of Crossing Easy

Cassette:

Number 1 Side A

Start 033 Stop 071

Intended Track:



Voyage 9
Recorder C
Page 3/10

OBSERVATIONS

I. <u>TIDES</u>	<u>Time</u>	<u>Elevation (ft)</u>	<u>Time</u>	<u>Elevation (ft)</u>
Astoria(Tongue Point)	<u>0927</u>	<u>-2.4 Low</u>	<u>1519</u>	<u>+3.2 High</u>
Correction	<u>-1^h10^m</u>	<u>+0.1</u>	<u>-0^h46^m</u>	<u>-0.7</u>
Entrance(North Jetty)	<u>0817</u>	<u>+2.5 Low</u>	<u>1433</u>	<u>+3.0 High</u>
Corrections on Astoria:	High Water	<u>-0^h46^m</u>	<u>-0.7 ft.</u>	
	Low Water	<u>-1^h10^m</u>	<u>+0.1 ft.</u>	

II. <u>TIDAL CURRENTS</u>	<u>Time</u>	<u>Current (Kt)</u>	<u>Time</u>	<u>Current (Kt)</u>
Grays' Hbr. Entrance	<u>0628</u>	<u>2.4 Ebb</u>	<u>0922</u>	<u>Slack</u>
Correction	<u>+0^h20^m</u>	<u>+1.5</u>	<u>+0^h05^m</u>	<u>-</u>
Entrance (Buoy No. 12)	<u>0648</u>	<u>3.6 Ebb</u>	<u>0927</u>	<u>Slack</u>
Corrections on Gray's Hbr.	Slack Water	<u>+0^h 05^m</u>		
	Max. Current	<u>+0^h 20^m</u>	Flood Ratio 1.4	Ebb Ratio 1.5

III PRE-RUN OBSERVATIONS

Time: 0850
Weather: FAIR
Temperature: 43°F Visibility: UNLIMITED
Wind: NW 10-15 KNOTS
Sea State: Seas: NW WIND CHOP Swell NIL
1-2'

IV. POST-RUN OBSERVATIONS

Time: 0935
Weather: FAIR
Temperature: 56°F Visibility: UNLIMITED
Wind: NW 15 KNOTS
Sea State: Seas: NW Swell WINDWAVE
2-4' 10-12'
10 Kt

Voyage 9Recorder CBPage A / 10

OBSERVATIONS DURING RUN

NOTE: Observations are to be recorded approximately every 2 minutes or when course and/or speed changes or other noteworthy events occur.

TIME	SHIP					EVENT / COMMENT
	Course °T	Speed Kts	Pitch/RPM Ft/RPM	Humidity G/mg (°m)		
0857 0856	275	14.2	16	278.8	3.8W	-----
0858	265	14.5	16	272	7W	-----
0900	253	14.8	16	258	5W	-----
0903	255	13.8	15	258.5	3.5W	-----
0905	230	—	—	235.4	5.4W	-----
0907	227	13.1	15.5	231.8	4.8W	-----
0909	220	13.2	15.5	222.4	2.4W	-----
0911	221	12.7	15	223	2W	-----
0913	218.5	12.4	15.5	219	1.5W	-----
0915	222	12.0	15	224.9	2.9W	-----
0918	220	13.1	15	221.8	1.8W	-----
STOP 0919						-----

1 15' to 20'

3.2' AS - 10' CONTINUOUS OF 10'

Voyage 1Recorder 4Page 5 / 10

INSTRUMENT CHECK & CALIBRATION

	Pre-Run	Post-Run	Comments
I. TAPE HEADS			
Clean HP Tape Head	✓	-	
Clean Qantex Tape Head	✓	-	
II. PITCH			
Level	/	/	
+45° (Down by Bow)	/	/	
-45° (Down by Stern)	/	/	
III. ROLL			
Level	/	/	
+45° (To Port)	/	/	
-45° (To Starboard)	/	/	
IV. HEAVE			
Rest	/	/	
Positive Acc. (Up)	/	/	
Negative Acc. (Down)	/	/	
V. HEADING			
Time	0842	0930	Ship's Gyro Deviation: 1.2° E
Gyro (°T)	315.5	161.9	
Corrected Ship's Gyro (°T)	315.5	160.0	
Deviation	-0-	1.9° W	Drift Rate: 1.9° in 45m 0.04°/min - W
VI. MINI RANGER			
Byte Test Card Check	/	/	New Station @ CMC 5. Leds OK
VII. SYSTEM TEST			
Record on Qantex & Playback	/	/	
VIII. OBTAIN COURSE/RUDDER ANGLE RECORD		/	
IX. OBTAIN FATHOMETER RECORD		/	

11/4/78
Page C/10

VOY #9 PRE RUN CHECK

Pitch= 000.0deg
Roll= -000.3deg
Accel= 1.003Gs
Hdng= 255.7deg
A Rng=?????yds
B Rng=?????yds
Time: 00:07:21

Pitch= 045.5deg
Roll= 008.6deg
Accel= 1.003Gs
Hdng= 255.4deg
A Rng=?????yds
B Rng=?????yds
Time: 00:07:37

Pitch= -045.3deg
Roll= -002.9deg
Accel= 1.003Gs
Hdng= 255.3deg
A Rng=?????yds
B Rng=?????yds
Time: 00:07:52

Pitch= 001.1deg
Roll= 044.7deg
Accel= 1.005Gs
Hdng= 254.9deg
A Rng=?????yds
B Rng=?????yds
Time: 00:08:16

Pitch= -002.9deg
Roll= -046.1deg
Accel= 1.003Gs
Hdng= 254.8deg
A Rng=?????yds
B Rng=?????yds
Time: 00:08:24

Pitch= 001.1deg
Roll= -011.4deg
Accel= 1.628Gs
Hdng= 253.8deg
A Rng=?????yds
B Rng=?????yds
Time: 00:09:16

Pitch= 014.9deg
Roll= 012.2deg
Accel= -0.295Gs
Hdng= 253.5deg
A Rng=?????yds
B Rng=?????yds
Time: 00:09:29

VOYAGE # 9

PRE RUN EQUIPMENT CHECK

VOY #9 QUANTON PLAYBACK
PRE RUN

Pitch= 000.0deg
Roll= -000.3deg
Accel= 0.999Gs
Hdng= 246.8deg
A Rng=?????yds
B Rng=?????yds
Time: 00:14:30 EOT

Pitch= 000.0deg
Roll= -000.3deg
Accel= 1.000Gs
Hdng= 246.2deg
A Rng=?????yds
B Rng=?????yds
Time: 00:15:27 EOT

VOY #9 TAPE PLAYBACK
PRE RUN

11/4/76
 PAGE 2/10

POST RUN CHECK VOYAGE#

VOYAGE # 9

POST RUN EQUIPMENT CHECK

Pitch= 001.1deg
 Roll= 000.9deg
 Accel= 0.943Gs
 Hdng= 189.1deg
 A Rng=016742yds
 B Rng=014136yds
 Time: 09:39:05

Pitch= 045.4deg
 Roll=-002.2deg
 Accel= 0.994Gs
 Hdng= 189.4deg
 A Rng=016742yds
 B Rng=014364yds
 Time: 09:39:40

Pitch=-044.3deg
 Roll=-001.5deg
 Accel= 1.059Gs
 Hdng= 189.0deg
 A Rng=016742yds
 B Rng=014444yds
 Time: 09:39:54

Pitch=-001.6deg
 Roll= 044.3deg
 Accel= 0.951Gs
 Hdng= 189.1deg
 A Rng=016742yds
 B Rng=014506yds
 Time: 09:40:04

Pitch= 000.8deg
 Roll=-045.4deg
 Accel= 1.003Gs
 Hdng= 189.7deg
 A Rng=016742yds
 B Rng=014553yds
 Time: 09:40:11

Pitch=-005.6deg
 Roll= 000.4deg
 Accel= 1.314Gs
 Hdng= 189.5deg
 A Rng=016999yds
 B Rng=014645yds
 Time: 09:40:25

Pitch= 015.2deg
 Roll= 025.6deg
 Accel=-0.207Gs
 Hdng= 189.9deg
 A Rng=016999yds
 B Rng=014633yds
 Time: 09:40:30

EDITED TAPE RESULTS

VOYAGE# 9

4 scans at
 090945

6 scans at
 090946

4 scans at
 090947

6 scans at
 090948

4 scans at
 090949

6 scans at
 090950

4 scans at
 090951

file mark

POST RUN TAPE RUN BACK
 VOYAGE# 9

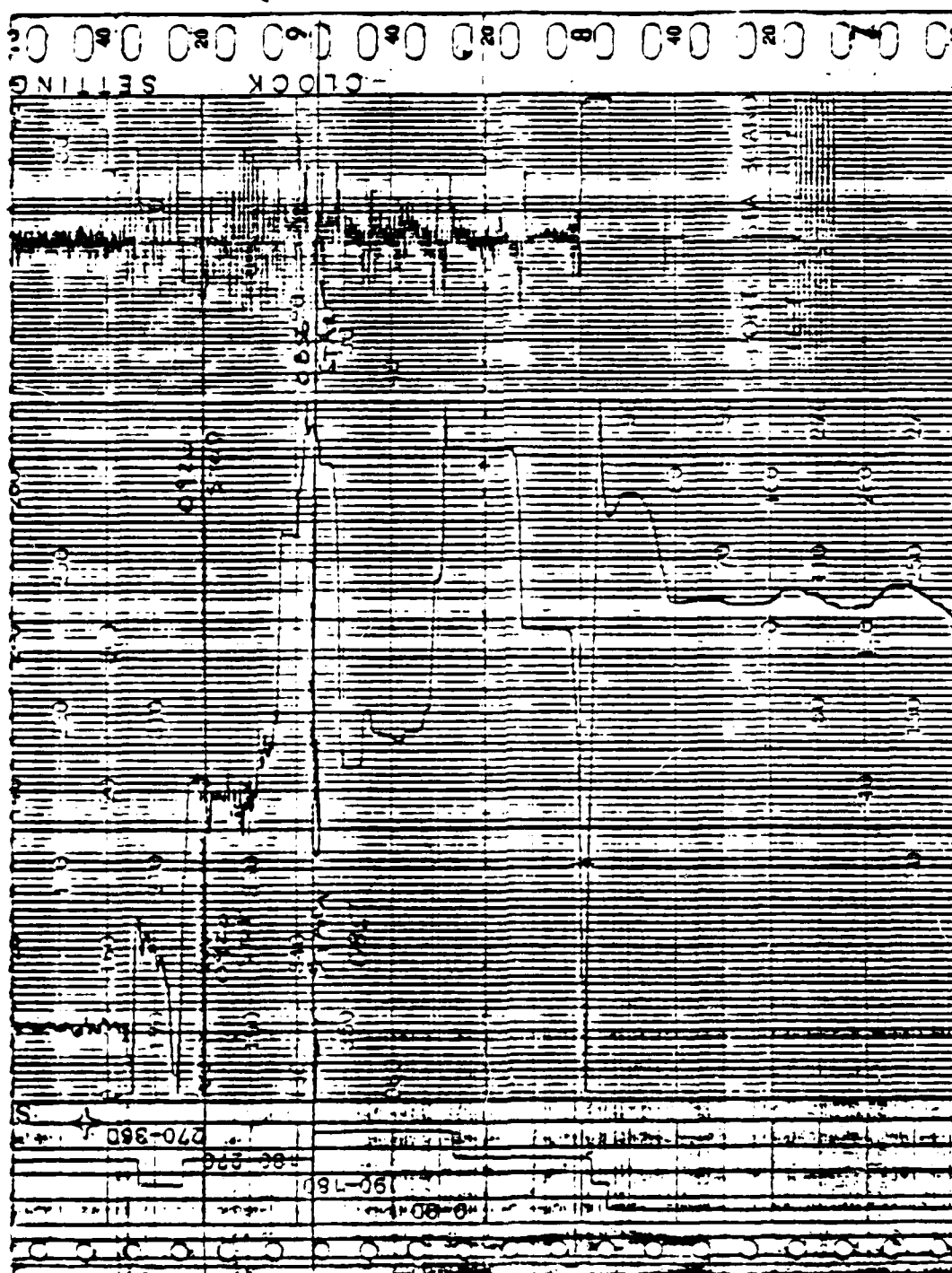
Pitch= 000.1deg
 Roll=-000.9deg
 Accel= 1.003Gs
 Hdng= 279.0deg
 A Rng=009278yds
 B Rng=002490yds
 Time: 08:56:00

Pitch= 000.4deg
 Roll= 000.5deg
 Accel= 0.958Gs
 Hdng= 216.1deg
 A Rng=015345yds
 B Rng=009855yds
 Time: 09:19:02

EOT

COURSE & RUDDER ANGLE RECORD

VOYAGE NO. 9

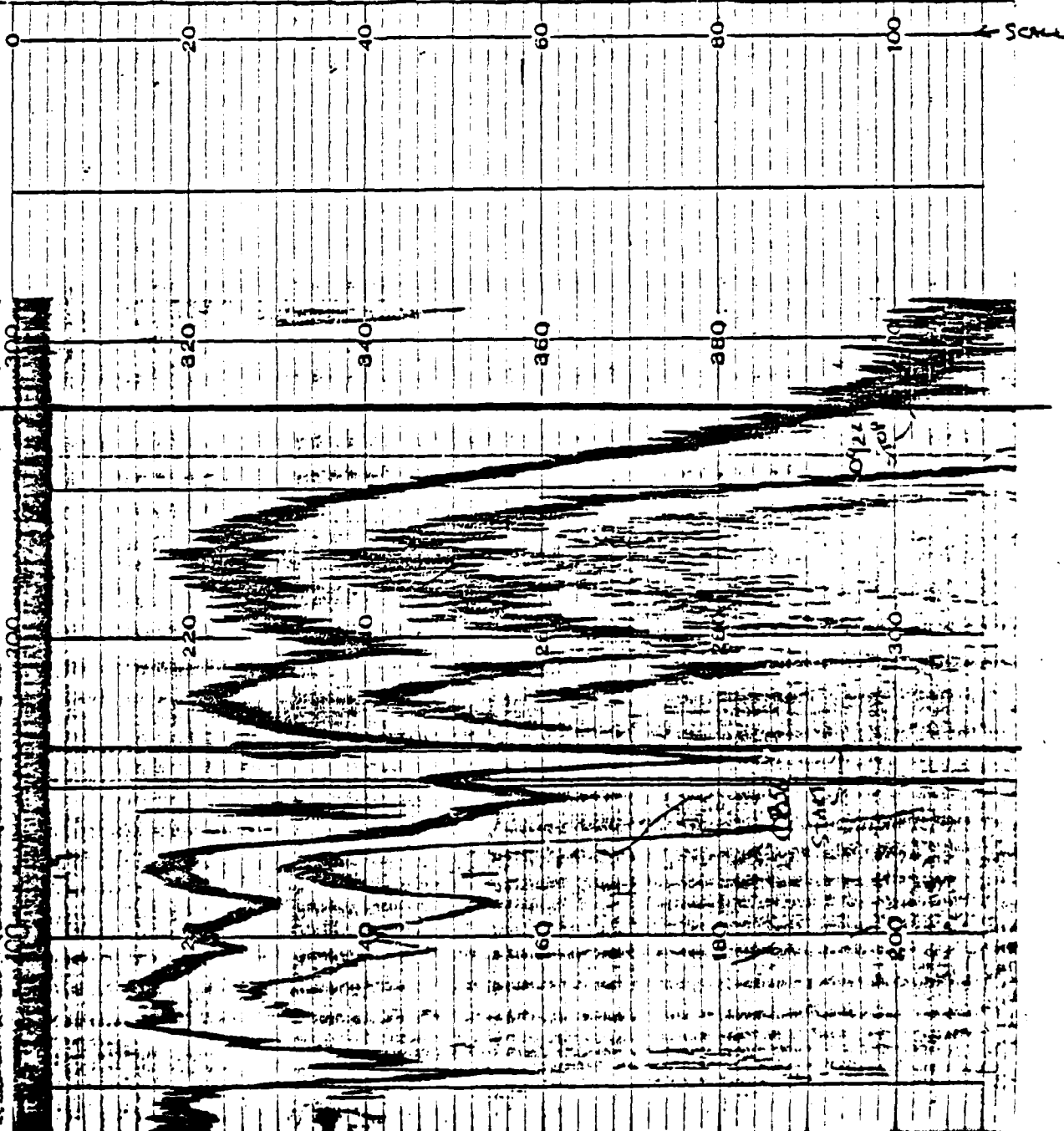


FATHOMETER RECORD

Voyage No. 9

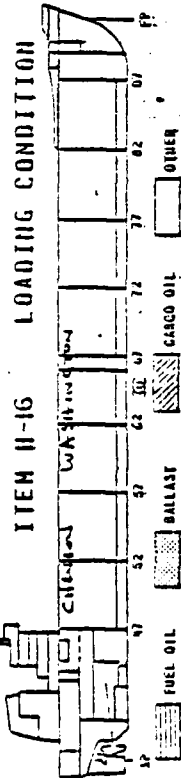
SOUNDINGS IN
FT. BELOW KEEL

CHART 7428-1001-G1 DEPTH IN FEET OR FATHOMS RAYTHEON CO.



CLASS FORM

35000 DWT GAS TURBINE TANKER ITEM H-16 LOADING CONDITION



LOAD CONDITION: BALLAST MAX. SHEAR: MAX. BENDING: VULCAN No. 9

CARGO

NO.	CU'	24S	101S	VCO	WM	LCG	LM	WHS
1	P/S	—	—	—	—	227.5	—	—
2	P/S	—	—	—	—	172.1	—	—
3	P/S	51.0	23.0	82.8	—	119.0	—	—
4	P/S	31.5	21.0	55.5	—	57.3	—	—
5	P/S	—	—	—	—	—	—	—
6	P/S	21.1	12.4	33.5	—	57.5	—	—
7	P/S	—	—	—	—	115.2	—	—
8	P/S	—	—	—	—	171.3	—	—
9	P/S	95.1	—	—	—	—	—	—
10	P/S	—	—	—	—	—	—	—
TOTAL								

CONSUMABLES

ITEM	24S	101S	VCO	WM	LCG	LM	WHS
1	—	6.9	23.6	105.2	224.6	—	—
2	—	35	30.4	232.7	208.9	—	—
3	—	100	41.8	424.4	218.5	—	—
4	—	12.3	6.0	55	255.0	—	—
5	—	—	—	—	—	—	—
TOTAL							

NOTES:
LENGTH BETWEEN PERPENDICULARS IS 625.00 FT.
LONGITUDINAL LEVERS ARE FROM MIDSHIP (+ FWD).
VERTICAL LEVERS ARE FROM HOLD BASELINE.
WHS IN FT-101S.
F.S. CORN = 2 WHS/DISPL.
P = LIQUID DENSITY IN BBL./CU. SEE NOTES IN ITEM 6-5.
IN VALVE COLUMNS INDICATE WHETHER SOURCE VALVE IS OPEN (O) OR SHUT (S).

BALLAST

TANK	LCG	WM	VCO	101S	WHS	LM	WHS
FORE PEAK	—	—	—	—	—	—	—
FWD DEEP	—	—	—	—	—	—	—
1 P/S	151.9	11.6	11.6	151.9	—	—	—
2 P/S	194.2	11.4	11.4	194.2	—	—	—
3 P/S	150.1	8.4	8.4	150.1	—	—	—
4 P/S	150.1	8.4	8.4	150.1	—	—	—
5 P/S	128.3	7.0	7.0	128.3	—	—	—
6 P/S	178.1	11.4	11.4	178.1	—	—	—
7 P/S	205.3	11.4	11.4	205.3	—	—	—
8 P/S	205.1	11.4	11.4	205.1	—	—	—
9 P/S	133.5	17.6	17.6	133.5	—	—	—
10 P/S	—	—	—	—	—	—	—
AFTER PEAK	—	—	—	—	—	—	—
TOTAL							

SUMMARY

ITEM	LCG	WM	VCO	101S	WHS	LM	WHS
CARGO	—	—	—	—	—	—	—
BALLAST	—	—	—	—	—	—	—
CONSUMABLES	—	—	—	—	—	—	—
TOTAL DWT	—	—	—	—	—	—	—
LIQUID SHIP	—	—	—	—	—	—	—
TOTAL DISPL.	—	—	—	—	—	—	—

DR

APPENDIX D
SUMMARY OF STABILITY CRITERION FOR PHASE II VOYAGES*

*Computed from available information provided
by the ship's engineering officers

SUMMARY OF STABILITY CRITERION
(Phase II Only)

VOYAGE NUMBER	TRANSVERSE METACENTRIC HEIGHT GM_T (ft)	LONGITUDINAL METACENTRIC HEIGHT GM_L (ft)
30	12.3	922.8
31	21.9	1126.0
32	7.3	798.3
33	14.7	989.3
34	12.9	957.5
35	4.4	893.2
36	2.7	675.1
37	14.0	1098.6
38	17.9	1039.9
39	12.2	913.8
40	21.0	1104.0
41	2.7	891.3
42	3.3	649.6
43	7.6	880.1
44	8.3	922.3
45	15.2	956.6
46	11.5	948.6
47	4.3	865.3
48	7.7	926.5
49 ^Δ	--	---
50	15.2	930.2
51	2.5	648.7
52	6.3	821.4
53	18.6	1027.3

Δ Data unavailable

APPENDIX E

MONTHLY SUMMARIES OF WEATHER OBSERVATIONS AT CLATSOP
COUNTY AIRPORT, ASTORIA, OREGON

MAY, 1978 - JUNE, 1978

NOVEMBER, 1978 - MARCH, 1979

OCTOBER, 1979 - APRIL, 1980

CLATSOP COUNTY AIRPORT

MONTHLY SUMMARY



HISTORIAN, OREGON

LATITUDE 40° 00' N LONGITUDE 125° 53' W (ELEVATION 1000000) 0 FT. SINGAPORE TIME US(0) SACIFIC WGAN 004224

250

CLATSOP COUNTY AIRPORT

MONTHLY SUMMARY



LATITUDE 49° 50' N LONGITUDE 123° 53' W ELEVATION (GROSS) 8 FT. STATIONED TIME 1450 PACIFIC ZONE 00-224

HISTORIA, OREGON

DATE	TEMPERATURE °F				DEGREE DAYS BASE 50°		WIND DIRECTION SPEED GUSTS	MOON PHASE PERCENT ILLUMINATED	PRECIPITATION INCHES	HAIL INCHES	FOG MILES	WIND DIRECTION SPEED GUSTS				SUNSHINE HOURS	SEA STATE HEIGHT PERIOD	
	MAXIMUM	MINIMUM	AVERAGE	WIND DIRECTION	WIND SPEED	WIND GUSTS						WIND DIRECTION	WIND SPEED	WIND GUSTS	WIND DIRECTION		WIND SPEED	WIND GUSTS
1	83	47	69	10	50	0	0	0	0	0	0	0	0	0	0	0	0	
2	86	50	68	4	53	0	1	0	0	0	0	0	0	0	0	0	0	
3	86	50	68	4	53	0	1	0	0	0	0	0	0	0	0	0	0	
4	86	50	68	4	53	0	1	0	0	0	0	0	0	0	0	0	0	
5	78	48	63	10	57	1	0	0	0	0	0	0	0	0	0	0	0	
6	88	56	72	7	56	3	1	0	0	0	0	0	0	0	0	0	0	
7	88	56	72	7	56	3	1	0	0	0	0	0	0	0	0	0	0	
8	88	56	72	7	56	3	1	0	0	0	0	0	0	0	0	0	0	
9	83	52	68	2	51	7	0	0	0	0	0	0	0	0	0	0	0	
10	83	52	68	2	51	7	0	0	0	0	0	0	0	0	0	0	0	
11	88	56	72	7	56	3	1	0	0	0	0	0	0	0	0	0	0	
12	82	50	66	3	51	3	0	0	0	0	0	0	0	0	0	0	0	
13	82	50	66	3	51	3	0	0	0	0	0	0	0	0	0	0	0	
14	82	50	66	3	51	3	0	0	0	0	0	0	0	0	0	0	0	
15	82	50	66	3	51	3	0	0	0	0	0	0	0	0	0	0	0	
16	85	52	69	2	51	5	0	0	0	0	0	0	0	0	0	0	0	
17	72	46	59	1	53	7	0	0	0	0	0	0	0	0	0	0	0	
18	56	36	46	4	52	4	0	0	0	0	0	0	0	0	0	0	0	
19	57	40	48	4	49	7	0	0	0	0	0	0	0	0	0	0	0	
20	67	46	57	0	51	5	0	0	0	0	0	0	0	0	0	0	0	
21	86	54	70	3	53	3	0	0	0	0	0	0	0	0	0	0	0	
22	84	52	68	1	51	7	0	0	0	0	0	0	0	0	0	0	0	
23	87	50	69	1	50	8	0	0	0	0	0	0	0	0	0	0	0	
24	87	50	69	1	50	8	0	0	0	0	0	0	0	0	0	0	0	
25	87	50	69	1	50	8	0	0	0	0	0	0	0	0	0	0	0	
26	80	52	66	3	53	4	0	0	0	0	0	0	0	0	0	0	0	
27	78	47	63	5	56	2	0	0	0	0	0	0	0	0	0	0	0	
28	57	31	44	1	56	5	0	0	0	0	0	0	0	0	0	0	0	
29	57	31	44	1	56	5	0	0	0	0	0	0	0	0	0	0	0	
30	58	34	46	3	54	4	0	0	0	0	0	0	0	0	0	0	0	

[illegible]

• EXTREMELY HIGH AND FREQUENT - LAST OCCURRENCE IN
1998 - 1999
• RARELY OBSERVED
• ALSO IN AN EARLIER DATE, IN 1995.
• HIGHLY - VISIBILITY IN A RARE CASE.
FIGURES FOR WIND SPEEDS AND TENS OF DE-
GREES DEGREES FROM 1000 TO 1200 TO 1400
FROM 1000 TO 1200 TO 1400 TO 1600 TO 1800

MORE OBSERVATIONS PER DAY AT 1-MINUTE INTERVALS.
FASTEST HILL AND SPEEDS ARE EASIEST TO OBSERVE
ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN 15'S
OR DEGREES. THE / WITH THE DIRECTION INDICATES
NEAR JET SPEED.
ANY CLOUDS DETECTED WILL BE CORRECTED AND
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN
THE ANNUAL SUMMARY

SUMMARY BY HOURS

TABLE 1. Comparison of the performance of the different models.											
Model	No. of cases	No. of patients	No. of deaths	No. of survivors	No. of relapses	No. of recurrences	No. of transfers	No. of discharges	No. of admissions	No. of re-admissions	No. of re-admissions
1	311	51	30	25	5	62	51	98	1	1	2
2	24	4	3	2	1	5	5	1	1	1	1
3	31	5	3	2	1	5	5	1	1	1	1
4	31	5	3	2	1	5	5	1	1	1	1
5	31	5	3	2	1	5	5	1	1	1	1
6	31	5	3	2	1	5	5	1	1	1	1
7	31	5	3	2	1	5	5	1	1	1	1
8	31	5	3	2	1	5	5	1	1	1	1
9	31	5	3	2	1	5	5	1	1	1	1
10	31	5	3	2	1	5	5	1	1	1	1
11	31	5	3	2	1	5	5	1	1	1	1
12	31	5	3	2	1	5	5	1	1	1	1
13	31	5	3	2	1	5	5	1	1	1	1
14	31	5	3	2	1	5	5	1	1	1	1
15	31	5	3	2	1	5	5	1	1	1	1
16	31	5	3	2	1	5	5	1	1	1	1
17	31	5	3	2	1	5	5	1	1	1	1
18	31	5	3	2	1	5	5	1	1	1	1
19	31	5	3	2	1	5	5	1	1	1	1
20	31	5	3	2	1	5	5	1	1	1	1
21	31	5	3	2	1	5	5	1	1	1	1
22	31	5	3	2	1	5	5	1	1	1	1
23	31	5	3	2	1	5	5	1	1	1	1
24	31	5	3	2	1	5	5	1	1	1	1
25	31	5	3	2	1	5	5	1	1	1	1
26	31	5	3	2	1	5	5	1	1	1	1
27	31	5	3	2	1	5	5	1	1	1	1
28	31	5	3	2	1	5	5	1	1	1	1
29	31	5	3	2	1	5	5	1	1	1	1
30	31	5	3	2	1	5	5	1	1	1	1
31	31	5	3	2	1	5	5	1	1	1	1
32	31	5	3	2	1	5	5	1	1	1	1
33	31	5	3	2	1	5	5	1	1	1	1
34	31	5	3	2	1	5	5	1	1	1	1
35	31	5	3	2	1	5	5	1	1	1	1
36	31	5	3	2	1	5	5	1	1	1	1
37	31	5	3	2	1	5	5	1	1	1	1
38	31	5	3	2	1	5	5	1	1	1	1
39	31	5	3	2	1	5	5	1	1	1	1
40	31	5	3	2	1	5	5	1	1	1	1
41	31	5	3	2	1	5	5	1	1	1	1
42	31	5	3	2	1	5	5	1	1	1	1

HOURLY PRECIPITATION WATER EQUIVALENT IN INCHES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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DATA SERVICE

Daniel B. Mitchell
DIRECTOR, NATIONAL ORIGIN SERIES

JSCORR--NOOR--ASMEVILLE 27/78/7 250

OBSERVATIONS AT 3-HOUR INTERVALS

OBSERVATIONS LONG AT 3-HOUR INTERVALS																			
HOUR	DAY	MONTH	YEAR	TIME	WIND	TEMPERATURE	HUMIDITY	PRESSURE	SEA	WIND	TEMPERATURE	HUMIDITY	PRESSURE	SEA	WIND	TEMPERATURE	HUMIDITY	PRESSURE	SEA
21	01	10	10	01	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
22	01	10	10	02	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
23	01	10	10	03	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
24	01	10	10	04	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
25	01	10	10	05	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
26	01	10	10	06	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
27	01	10	10	07	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
28	01	10	10	08	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
29	01	10	10	09	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
30	01	10	10	10	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
31	01	10	10	11	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
32	01	10	10	12	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
33	01	10	10	13	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
34	01	10	10	14	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
35	01	10	10	15	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
36	01	10	10	16	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
37	01	10	10	17	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
38	01	10	10	18	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
39	01	10	10	19	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
40	01	10	10	20	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
41	01	10	10	21	01	50	48	1001.0	3	01	50	48	1001.0	3	01	50	48	1001.0	3
42	01	10	10	22	01	50	48	1001.0	3	01	50	48	1001.						

4025

CEILING

LIFE : 0000000000000000

MEAT MEAT

- 0 FROGG
1 FROG
2 SQUALL
3 RAIN
4 RAIN SHOWERS
5 FREEZING RAIN
6 DRIZZLE
7 FREEZING DRIZZLE
8 SNOW
9 SNOW PELLETS
10 ICE CRYSTALS
11 SNOW SHOWERS
12 SNOW GRAINS
13 ICE PELLETS

4100

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 0... 09 FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 30 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;
MULTIPLY BY 1.15 TO CONVERT
TO MILES PER HOUR.

STATION
0470010 200000

YEAR & MONTH

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 29801



NOVEMBER 1978 ASTORIA, OREGON

SUMMARY BY HOURS

4000 OBSERVATIONS PER DAY AT 3-MINUTE INTERVALS.
FASTEST KILL AND SPEEDS ARE FASTEST OBSERVED
ONE-MINUTE VALUES WHEN DIRECTION IS IN TERMS
OF DEGREES. THE - WITH THE DIRECTION INDICATES
NEAR JUST SPEED.
ALL ECHOES DETECTED WILL BE CORRELATED AND
CHANGES IN SUMMARY DATA WILL BE ASSOCIATED W
THE ANNUAL SUMMARY

[illegible][illegible]

USCORN--NORAN--ASHEVILLE 12/25/70 200

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTE

CEILING
WALL, INTERIOR - SEE PAGE 100

HEATHEN

[illegible]

4140

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH: 01-09 FOR EAST, 10 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;
MULTIPLY BY 1.15 TO CONVERT
TO MILES PER HOUR.

U.S. DEPARTMENT OF COMMERCE
NATIONAL CLIMATIC CENTER
FEDERAL BUILDING
ASHEVILLE, N.C. 28801

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COM-210



FIRST CLASS

USCJN - NORM - ASMEVILLE 31/25/79 220

OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES

CEILING
JUL 1 1964

WEATHER

- ```

0 FORWARD
1 FORWARD?COM
2 SQUALL
3 PAIR
4 PAIR SQUADS
5 FREEZING PAIR
6 FREEZE
7 FREEZING FREEZE
8 SQUAD
9 SQUAD FREEZE'S
10 CE REPTILES
11 SQUAD SQUADS
12 SQUAD SQUADS
13 CE FREEZE'S
14 PAIR
15 FOG
16 CE FOG
17 GROUND FOG
18 SLUING JUST
19 SLUING SQUAD
20 SLUING SQUAD
21 SLUING SQUAD
22 SQUAD
23 WARE
24 JUST

```

ENCLOSURE

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 10 FOR EAST, 0 FOR SOUTH, 20 FOR WEST. ENTRY OF 0 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS  
MULTIPLY BY 1.15 TO CONVERT  
TO MILES PER HOUR.

STATION  
ASTORIA OREGON

YEAR 6 MONTH  
70 12

U.S. DEPARTMENT OF COMMERCE  
NATIONAL CLIMATIC CENTER  
FEDERAL BUILDING  
ASHEVILLE, N.C. 28901

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID  
U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS



CLATSOP COUNTY AIRPORT

### MONTHLY SUMMARY



Latitude 40° 20' N Longitude 123° 43' W Elevation 1000m Date 07/11/2000 Time 14:00 Pacific Zone 004224

JANUARY 1979

# ASTORIA, OREGON

[illegible][illegible]

\* ESTIMATE FOR THE MONTH OF LAST OCCURRENCE OF  
\* MONTHLY INCOME.  
\* MONTHLY INCOME.  
\* ALSO IN AN EARLIER DATE, IN CENTS.  
\* MONTHLY INCOME, IN CENTS.  
\* CENTS IN THE MONTH OF LAST OCCURRENCE OF  
\* MONTHLY INCOME, IN CENTS.  
\* CENTS IN THE MONTH OF LAST OCCURRENCE OF  
\* MONTHLY INCOME, IN CENTS.

ALL OBSERVATIONS ARE SET AT 1-MINUTE INTERVALS.  
FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED  
20-MINUTE VALUES AND WIND DIRECTION ARE A 15-  
DEGREE. WE WITH THE DIRECTION INDICATES  
ARE JUST SPEED.  
ALL READINGS REPORTED WILL BE CORRECTED AND  
CHANGES IN SUMMARY DATA WILL BE INDICATED IN  
THE MONTHLY SUMMARY

SUMMARY BY TOPICS

| 1 2 3 4 5 6 7 8 9 10 |  |  |  |  |  |  |  |  |  | 11 12 13 14 15 16 17 18 19 20 |  |  |  |  |  |  |  |  |  |
|----------------------|--|--|--|--|--|--|--|--|--|-------------------------------|--|--|--|--|--|--|--|--|--|
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SUBSCRIPTION PRICE: \$2.55 PER YEAR INCLUDING MAIL. FOREIGN MAIL \$3.85 EXTRA. SINGLE COPIES 10 CENTS FOR ORDERS TO ANNUAL ISSUE. THERE IS A MINIMUM ORDER OF 12 COPIES FOR EACH COUNTRY. ORDERED ISSUES OF PUBLICATIONS, NAME CHANGES, ADDRESS CHANGES, TO DEPARTMENT OF COMMERCE, WASHINGTON, D.C. 20540. ORDER, AND QUOTATIONS FOR VARIOUS COUNTRIES. FEDERAL BUILDING, WASHINGTON, D.C. 20540. PHONE 202-343-7000.

1. In 1971, the Board of Directors of the National Association of Manufacturers (NAM) adopted a resolution that stated:

**noaa** NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION ENVIRONMENTAL DATA AND INFORMATION SERVICE

*Daniel R. Mitchell*  
DIRECTOR, NATIONAL SCIENCE CENTER

USCJNM - HQNM - AMELVILLE 23/07/79 250

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

W01E9

CEILING  
WALL: 1200X6000 WITH FLOORING

2025

- 0 COWBOY  
1 COWBOY STEW  
2 SQUALL  
3 RAIN  
4 RAIN SMOG  
5 FREEZING RAIN  
6 DRIZZLE  
7 FREEZING DRIZZLE  
8 SNOW  
9 SNOW PELLETS  
10 ICE CRYSTALS  
11 SNOW SMOG  
12 SNOW PELLETS  
13 ICE  
14 FOG  
15 ICE FOG  
16 DRIVING FOG  
17 DRIVING SAND  
18 DRIVING SAND  
19 DRIVING SMOG  
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21 FOG  
22 DUST

2.1.25

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 00 IS FOR EAST, 18 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;  
MULTIPLY BY 1.15 TO CONVERT  
TO MILES PER HOUR.

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AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID

U.S. DEPARTMENT OF COMMERCE

COM-210



FIRST CLASS

U.S. DEPARTMENT OF COMMERCE  
NATIONAL CLIMATIC CENTER  
FEDERAL BUILDING  
ASHEVILLE, N.C. 28801

100%

NATIONAL WEATHER SERVICE OF  
CLATSOP COUNTY AIRPORT

## Local Climatological Data



### MONTHLY SUMMARY

LATITUDE 48° 00' N LONGITUDE 123° 53' W ELEVATION 16000 FT. STATION TIME USED: PACIFIC 1500 00-324

FEBRUARY 1979

ASTORIA, OREGON

| DATE           | TEMPERATURE |         |      |            | WIND           |            | WIND DIRECTION |            | WIND SPEED     |            | WIND DIRECTION |            | WIND SPEED     |            | WIND DIRECTION |            | WIND SPEED     |            | WIND DIRECTION |            | WIND SPEED     |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|----------------|-------------|---------|------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                | MAXIMUM     | MINIMUM | MEAN | WIND CHILL | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION | WIND SPEED | WIND DIRECTION |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|                |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND DIRECTION | WIND SPEED     | WIND DIRECTION | WIND SPEED     | WIND DIRECTION | WIND SPEED     | WIND DIRECTION | WIND SPEED     | WIND DIRECTION | WIND SPEED     |                |                |                |                |                |                |                |                |                |                |
| 1              | 34          | 21      | 28   | -14        | 18             | 37         | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 2              | 35          | 18      | 27   | -15        | 20             | 38         | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              | 0          | 0              |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 3              | 37          | 31      | 34   | -6         | 32             | 31         | 0              | 1          | 6              | 1.23       | 0              | 30         | 28             | 08         | 2,51           | 3,81       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 4              | 47          | 35      | 41   | -2         | 40             | 24         | 0              | 1          | 4              | 0.60       | 0              | 30         | 28             | 01         | 6,81           | 6,81       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 5              | 48          | 43      | 46   | 3          | 48             | 18         | 0              | 1          | 4              | 0.31       | 0              | 30         | 28             | 01         | 10,31          | 10,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 6              | 48          | 42      | 45   | 3          | 47             | 18         | 0              | 1          | 4              | 1.88       | 0              | 30         | 28             | 01         | 18,31          | 18,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 7              | 48          | 34      | 41   | -2         | 38             | 24         | 0              | 1          | 4              | 0.08       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 8              | 53          | 42      | 48   | 5          | 44             | 17         | 0              | 1          | 4              | 0.13       | 0              | 30         | 28             | 01         | 13,31          | 13,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 9              | 53          | 38      | 46   | 1          | 43             | 21         | 0              | 1          | 4              | 0.31       | 0              | 30         | 28             | 01         | 7,41           | 7,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 10             | 48          | 40      | 44   | 1          | 43             | 20         | 0              | 1          | 4              | 0.31       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 11             | 50          | 45      | 48   | 4          | 46             | 17         | 0              | 1          | 4              | 0.11       | 0              | 30         | 28             | 01         | 10,31          | 10,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 12             | 58          | 46      | 52   | 7          | 47             | 14         | 0              | 1          | 4              | 0.78       | 0              | 30         | 28             | 01         | 18,31          | 18,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 13             | 52          | 31      | 42   | -2         | 38             | 23         | 0              | 1          | 4              | 0.11       | 0              | 30         | 28             | 01         | 17,31          | 17,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 14             | 45          | 27      | 36   | -3         | 30             | 28         | 0              | 2          | 4              | 0.31       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 15             | 45          | 33      | 39   | -6         | 34             | 28         | 0              | 2          | 4              | 0.04       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 16             | 46          | 37      | 42   | -2         | 37             | 23         | 0              | 4          | 4              | 0.58       | 0              | 30         | 28             | 01         | 6,41           | 6,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 17             | 51          | 38      | 45   | 1          | 44             | 20         | 0              | 4          | 4              | 0.88       | 0              | 30         | 28             | 01         | 10,41          | 10,41      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 18             | 50          | 38      | 45   | 1          | 41             | 20         | 0              | 4          | 4              | 0.14       | 0              | 30         | 28             | 01         | 6,41           | 6,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 19             | 44          | 34      | 40   | -2         | 38             | 23         | 0              | 4          | 4              | 0.31       | 0              | 30         | 28             | 01         | 4,41           | 4,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 20             | 49          | 34      | 42   | -2         | 38             | 23         | 0              | 4          | 4              | 0.07       | 0              | 30         | 28             | 01         | 8,31           | 8,31       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 21             | 47          | 38      | 43   | -2         | 38             | 23         | 0              | 4          | 4              | 0.31       | 0              | 30         | 28             | 01         | 4,41           | 4,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 22             | 44          | 37      | 43   | -1         | 38             | 23         | 0              | 4          | 4              | 0.31       | 0              | 30         | 28             | 01         | 8,31           | 8,31       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 23             | 46          | 38      | 43   | -1         | 38             | 23         | 0              | 1          | 4              | 0.37       | 0              | 30         | 28             | 01         | 5,41           | 5,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 24             | 53          | 38      | 46   | 2          | 43             | 18         | 0              | 1          | 4              | 0.58       | 0              | 30         | 28             | 01         | 15,31          | 15,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 25             | 54          | 43      | 48   | 5          | 46             | 18         | 0              | 1          | 4              | 0.88       | 0              | 30         | 28             | 01         | 18,31          | 18,31      | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 26             | 47          | 42      | 45   | 1          | 42             | 20         | 0              | 1          | 4              | 0.18       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 27             | 50          | 35      | 43   | -1         | 38             | 23         | 0              | 1          | 4              | 0.58       | 0              | 30         | 28             | 01         | 6,41           | 6,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 28             | 48          | 28      | 38   | -6         | 36             | 23         | 0              | 1          | 4              | 0.14       | 0              | 30         | 28             | 01         | 3,41           | 3,41       | 21             | 37         | 10             | 10         | 10             |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| SUM            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            | SUM            |
| 1234           |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           | 1234           |
| AVG            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            | AVG            |
| 47.6           |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | 29.3           | 41.8           | -1.1           | 38             | 42             | 2              | 4              | 25             | 1.20           | 0              | 30             | 28             | 01             | 10,31          | 10,31          | 21             | 37             | 10             | 10             | 10             |
| NUMBER OF DAYS |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS | NUMBER OF DAYS |
| 1              |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              | 1              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |
| -14            |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | -15            | -6             | -2             | 3              | 47             | 18             | 3              | 1              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              | 0              |
| WIND CHILL     |             |         |      |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                |            |                | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     | WIND CHILL     |                |                |

SUMMARY BY HOURS

| Date | Time | Lat | Long | Alt | Wind |     | Temp | Humid | Pressure | Clouds | Visibility | Remarks |
|------|------|-----|------|-----|------|-----|------|-------|----------|--------|------------|---------|
|      |      |     |      |     | Dir  | Spd |      |       |          |        |            |         |
| 21   | 01   | 28  | 02   | 41  | 30   | 20  | 21   | 15    | 9        | 5      |            |         |
| 22   | 01   | 28  | 00   | 41  | 30   | 30  | 21   | 13    | 9        | 5      |            |         |
| 23   | 01   | 28  | 01   | 41  | 30   | 30  | 21   | 13    | 9        | 5      |            |         |
| 24   | 01   | 28  | 02   | 43  | 41   | 30  | 21   | 13    | 9        | 5      |            |         |
| 25   | 01   | 28  | 02   | 43  | 48   | 30  | 21   | 13    | 9        | 5      |            |         |
| 26   | 01   | 28  | 01   | 43  | 43   | 30  | 21   | 13    | 9        | 5      |            |         |
| 27   | 01   | 28  | 01   | 43  | 41   | 30  | 21   | 13    | 9        | 5      |            |         |
| 28   | 01   | 28  | 02   | 42  | 43   | 30  | 21   | 13    | 9        | 5      |            |         |

## HOURLY PRECIPITATION (WATER EQUIVALENT IN INCHES)

[illegible]

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*Daniel B. Mitchell*  
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOM--NOAA--ASHEVILLE

### OBSERVATIONS AT 3-HOUR INTERVALS

| HOUR | TEMPERATURE |     |     |     | WIND |       |     |       | TEMPERATURE |     |     |     | WIND |       |     |       | TEMPERATURE |     |     |     | WIND |       |     |       |
|------|-------------|-----|-----|-----|------|-------|-----|-------|-------------|-----|-----|-----|------|-------|-----|-------|-------------|-----|-----|-----|------|-------|-----|-------|
|      | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED | MAX         | MIN | Avg | REL | DIR  | SPEED | DIR | SPEED |
| 01   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 02   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 03   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 04   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 05   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 06   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 07   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 08   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 09   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 10   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 11   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 12   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 13   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 14   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 15   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 16   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 17   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 18   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 19   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 20   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 21   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 22   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 23   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 24   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 25   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 26   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 27   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 28   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 29   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 30   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 31   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 32   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 33   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 34   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 35   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 36   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 37   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 38   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 39   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 40   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 41   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 42   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 43   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 44   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 45   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 46   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 47   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 48   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 49   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 50   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 51   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 52   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 53   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 54   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 55   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 56   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 57   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 58   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 59   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 60   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 61   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 62   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 63   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 64   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 65   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 66   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 67   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 68   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 69   | 10          | 10  | 10  | 10  | 000  | 0     | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     | 25          | 27  | 27  | 10  | 10   | 10    | 0   | 0     |
| 70   | 10          | 10  | 10  | 10  | 000  | 0</   |     |       |             |     |     |     |      |       |     |       |             |     |     |     |      |       |     |       |

NOTES

CELLING

Uttar Pradesh Sahitya Akademi, Lucknow

## WEATHER

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DIRECTIONS ARE 'MOSE FROM  
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AN EQUAL OPPORTUNITY EMPLOYER

1. NAME OF THE PARTY  
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COM-210



FIRST CLASS

U.S. DEPARTMENT OF COMMERCE  
NATIONAL CLIMATIC CENTER  
FEDERAL BUILDING  
ASHEVILLE, N.C. 28801

AN EQUAL OPPORTUNITY EMPLOYER

CLATSOP COUNTY AIRPORT

## MONTHLY SUMMARY



LATITUDE 40° 09' N LONGITUDE 123° 53' W (ELEVATION 1000000) 8 FT. STANDARD TIME USED: PACIFIC MOON 00-224

**MARCH 1979**

**ASTORIA, OREGON**

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THE INFORMATION FOR THE AT - INFO RECORDS.  
FIRST WILL BE THE SPEED AND FIRST DEGREE  
- THE OTHER VALUES ARE THE DIRECTION AND THE  
IF NECESSARY, WE CAN USE THE DIRECTION INDICATES  
FOR JUST SPEED.  
ALL THE OTHER INFORMATION WILL BE GENERATED AND  
- THE DATA WILL BE ACQUIRED IN  
THE APPROPRIATE MANNER.

SUMMARY 97 -COURS

| SPEED OF LIGHT |  |  |  |  |  |  |  |  |  |
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185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-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James L. ...  
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... 1960

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

## NOTES

CEILING

DATE: 10/20/2019 TIME: 10:00 AM

## MEETING

- [illegible]

## 8440

DIRECTIONS ARE THOSE FROM WHICH WE WIND GLIMS. NO. OF WINDS OF DEGREES FROM THE NORTH. 0 TO 9 FOR EAST. 0 TO 90 FOR SOUTHWEST. 0 TO 9 FOR WEST. 0 TO 9 FOR THE DIRECTION COLUMN NO. LINES EACH.

WINDS IS EXPRESSED IN WINDS PER HOUR. 0 TO 1000000 IN WINDS PER HOUR.





OCTOBER 1979

ASTORIA, OREGON

6. LISTING FOR THE MONTH, LAST OCCURRENCE OF  
 NAME, NAME CODE,  
 \* NAME ADDRESS  
 \* ALSO IN AN EARLIER DATE, IN DATE,  
 NAME AND \* RESIDING IN FILE OR LESS,  
 FIGURES FOR WIND DIRECTIONS ARE TEN OF 36,  
 DIRECTIONS FROM THE NORTH, 10 = N, 40 =  
 20 = E, 50 = S, 60 = W, 70 = NW, 80 = NE, 90 = SE, 100 = SW, 110 = W, 120 = NW, 130 = N, 140 = E, 150 = S, 160 = W, 170 = NW, 180 = N, 190 = E, 200 = S, 210 = W, 220 = NW, 230 = N, 240 = E, 250 = S, 260 = W, 270 = NW, 280 = N, 290 = E, 300 = S, 310 = W, 320 = NW, 330 = N, 340 = E, 350 = S, 360 = W.

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.  
 FASTEST KILS AND SPEEDS ARE FASTEST OBSERVED  
 ONE-MINUTE VALUES WITH DIRECTIONS ARE IN TENS  
 OF DEGREES. THE WITH THE DIRECTION INDICATES  
 PERM SHOT SPEED.  
 ANY ERRORS DETECTED WILL BE CORRECTED AND  
 CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN  
 THE SUMMARY SUMMARY

| SUMMARY BY HOURS |                |               |               |         |          |               |            |                |               |               |         |                |
|------------------|----------------|---------------|---------------|---------|----------|---------------|------------|----------------|---------------|---------------|---------|----------------|
| FACTORS          |                |               |               |         |          |               |            |                |               |               |         | RESULTING WIND |
| TEMPERATURE      |                |               |               |         |          |               |            |                |               |               |         |                |
| WIND SPEED       | WIND DIRECTION | WIND VELOCITY | WIND PRESSURE | WIND IN | WIND OUT | WIND RELATIVE | WIND SPEED | WIND DIRECTION | WIND VELOCITY | WIND PRESSURE | WIND IN | WIND OUT       |
| 111              | 91             | 20.27         | 52            | 511     | 501      | 331           | 5          | 7              | 3             | 3             | 3       | 3              |
| 171              | 91             | 20.27         | 51            | 501     | 401      | 401           | 7          | 7              | 3             | 3             | 3       | 3              |
| 171              | 91             | 20.27         | 51            | 501     | 401      | 140           | 5          | 5              | 1             | 2             | 2       | 2              |
| 121              | 91             | 20.20         | 57            | 521     | 221      | 99            | 7          | 5              | 2             | 2             | 2       | 2              |
| 121              | 91             | 20.27         | 51            | 501     | 521      | 91            | 7          | 3              | 2             | 2             | 2       | 2              |
| 61               | 7              | 20.20         | 53            | 531     | 531      | 531           | 7          | 2              | 2             | 2             | 2       | 2              |
| 91               | 7              | 20.00         | 56            | 531     | 5        | 37            | 7          | 2              | 2             | 2             | 2       | 2              |
| 91               | 7              | 20.20         | 53            | 51      | 521      | 321           | 7          | 2              | 2             | 2             | 2       | 2              |

[illegible]

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

CEILING

THE UNIVERSITY OF CHICAGO

## FEATHER

- [illegible]

END

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 1.E.E. 09 FOR EAST. 1.S FOR SOUTH. 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS  
MULTIPLY BY 1.6 TO CONVERT  
TO MILES PER HOUR.

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FEDERAL BUILDING  
ASTENVILLE, N.C. 28801

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CLATSOP COUNTY AIRPORT

## MONTHLY SUMMARY

[illegible][illegible]

\* EXTREME FOR THE MONTH - LAST OCCURRENCE F  
MORE THAN ONE  
\* RACE AMOUNT  
\* ALSO ON AN EARLIER DATE, OR DATES.  
HEAVY FOG: - VISIBILITY 1/4 MILE OR LESS.  
FIGURES FOR WIND DIRECTIONS ARE TENS IF DE-  
GREES CLOCKWISE FROM TRUE NORTH 30 = CALM.  
DATA IN COLS. 4 AND 12-15 ARE BASED ON 1" R

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.  
FASTEST HILL WIND SPEEDS ARE FASTEST OBSERVED  
ONE-MINUTE VALUES WHEN DIRECTIONS ARE A FEW  
DEGREES THE WITH THE DIRECTION INDICATES  
PEAK JUST SPEED.  
ANY ERRORS DETECTED WILL BE CORRECTED AND  
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN  
THE ANNUAL SUMMARY

SUMMARY BY -OURS

| TEMPERATURE |     |      |           |         |          |      |      |           |       | WIND |       |
|-------------|-----|------|-----------|---------|----------|------|------|-----------|-------|------|-------|
| INSTR. TIME | LAT | LONG | SUN COVER | STATION | PRESSURE | TEMP | WIND | DIRECTION | SPEED | WIND |       |
|             |     |      |           |         |          |      |      |           |       | DIR  | SPEED |
| 27          | 9   | 30   | 571       | 441     | 421      | 391  | 961  | 4         | 13    | 3    | 9     |
| 28          | 51  | 30   | 361       | 431     | 411      | 381  | 941  | 4         | 2     | 6    | 9     |
| 29          | 1   | 30   | 261       | 431     | 411      | 391  | 961  | 4         | 2     | 6    | 9     |
| 30          | 1   | 30   | 281       | 441     | 451      | 411  | 9    | 2         | 2     | 6    | 9     |
| 31          | 30  | 271  | 531       | 411     | 421      | 381  |      | 2         | 18    | 6    | 9     |
| 32          | 30  | 261  | 521       | 471     | 421      |      |      | 2         | 19    | 6    | 9     |
| 33          | 30  | 271  | 511       | 471     | 421      |      |      | 2         | 19    | 6    | 9     |
| 34          | 30  | 281  | 501       | 471     | 421      |      |      | 2         | 19    | 6    | 9     |
| 35          | 30  | 281  | 501       | 471     | 421      |      |      | 2         | 19    | 6    | 9     |

## HOURLY PRECIPITATION WATER EQUIVALENT IN INCHES

[illegible]

|                     |                            |                          |                               |                                            |          |
|---------------------|----------------------------|--------------------------|-------------------------------|--------------------------------------------|----------|
| DESCRIPTION OF THE  | 92 55 PER YEAR             | INCLUDING ANNUAL SUMMARY | PROBATION TRAINING \$15 EXTRA | ANGLE COPY TO CENTER AND MONTHLY TO ANNUAL | SEE PAGE |
| 5.1 IN NEW JERSEY   | OF \$2.00 FOR EACH MOORE   | IF EMPLOYED              | ISSUES IN PUBLICATIONS        | PLANS                                      | REMARKS  |
| PAYMENTS, DEPOSITS, | AND DEDUCTIONS TO NATIONAL | HEALTH CENTER            | FEDERAL BUILDING, WASHINGTON, | 1980                                       | 1980     |

NOTES: (1) THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND IS DERIVED FROM RECORDS IN THE NATIONAL CLIMATE CENTER, ASHEVILLE, NORTH CAROLINA 28901.

noaa

NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATIONENVIRONMENTAL DATA AND  
RECOMMENDATION 1994-95

*[Handwritten signature]*

1500-1510

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

## CELLING

CEILING  
JHL INDICATES JHL LOW FUEL

## WEATHER

|     |               |
|-----|---------------|
| #   | TORNADO       |
| 1   | THUNDERSTORM  |
| 2   | SQUALL        |
| 3   | RAIN          |
| 4M  | RAIN SHOWERS  |
| 5R  | FREEZING RAIN |
| 6   | DRIZZLE       |
| 7L  | FREEZING DRIZ |
| 8   | SNOW          |
| 9P  | SNOW PELLETS  |
| 10  | ICE CRYSTALS  |
| 11S | SNOW SHOWERS  |
| 12G | SNOW GRAINS   |
| 13P | ICE PELLETS   |
| 14  | HAIL          |
| 15F | FOG           |
| 16  | ICE FOG       |
| 17  | DRUM FOG      |
| 18  | BLOWING DUST  |
| 19S | BLOWING SAND  |
| 20  | BLOWING SNOW  |
| 21E | BLOWING SPRAY |
| 22  | SMOKE         |
| 23  | HAZE          |
| 24  | DUST          |

41 NO

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS, INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 1-2, 39 FOR EAST, 10 FOR SOUTH, 27 FOR WEST, ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS;  
MULTIPLY BY 1.15 TO CONVERT  
TO MILES PER HOUR.

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FIRST CLASS

CLATSOP COUNTY AIRPORT

## MONTHLY SUMMARY



ASTORIA, OREGON

[illegible][illegible]

SECRET - NOFORN - AS-E

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES  
CELLING  
ONE ASSURES UNLIMITED

HEATHER

1 THUNDER  
2 THUNDERSTORM  
3 SQUALL  
4 RAIN  
5 RAIN SHOWERS  
6 FREEZING RAIN  
7 DRIZZLE  
8 FREEZING DRIZZLE  
9 SNOW  
10 SNOW PELLETS  
11 ICE CRYSTALS  
12 SNOW SHOWERS  
13 SNOW DRAINS  
14 ICE PELLETS  
15 HAIL  
16 FOG  
17 ICE FOG  
18 THUNDER FOG  
19 BLOWING DUST  
20 BLOWING SAND  
21 BLOWING SNOW  
22 BLOWING SMOKE  
23 SMOKE  
24 HAZE  
25 DUST

WIND  
DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TERMS OF DEGREES FROM TRUE NORTH: 0 FOR EAST, 90 FOR SOUTH, 180 FOR WEST. ENTRY OF 0 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS. MULTIPLY BY .5 TO CONVERT TO MILES PER HOUR.

SPEED IS EXPRESSED IN KNOTS  
MULTIPLY BY 1.67 TO CONVERT  
TO MILES PER HOUR

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FIRST CLASS

JANUARY 1980 ASTORIA, OREGON

232



ASTORIA, OREGON

JSCOMM--NOAA--ASHEVILLE 21:28:00 252

### OBSERVATIONS AT 3-HOUR INTERVALS

[illegible]

NOTES  
CEILING  
UNL INDICATES UNLIMITED

```

WEATHER
TORNADO
J HUNDERSTORM
J SQUALL
2R RAIN
2R RAIN SHOWERS
2R FREEZING RAIN
2L DRIZZLE
2L FREEZING DRIZZLE
S SNOW
3P SNOW PELLETS
3P ICE CRYSTALS
3S SNOW SHOWERS
5G SNOW GRAINS
5G ICE PELLETS
4 HAIL
F FOG
2F ICE FOG
2F GROUND FOG
3N BLOWING DUST
3N BLOWING SAND
3S BLOWING SNOW
3Y BLOWING SPRAY
K SMOKE
H HAZE
0 DUST

```

WIND

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TERMS OF DEGREES FROM TRUE NORTH: 0, 90, 180 FOR EAST, 270 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS. MULTIPLY BY 1.6 TO CONVERT TO MILES PER HOUR.

STATION  
ASTORIA OREGON  
  
AN EQUAL OPPORTUNITY EMPLOYER

YEAR 6 MONTH

30 12

POSTAGE AND FEES PAID  
U.S. DEPARTMENT OF COMMERCE  
COM-210



11:00 AM - 12:00 PM



CLATSOP COUNTY AIRPORT

### MONTHLY SUMMARY



**PLATE 1**

ASTORIA, OREGON

LATITUDE 46° 29' N LONGITUDE 123° 53' W ELEVATION (GROUND) 3 FT. STANDARD TIME USED: PACIFIC -8 AM 194224

[illegible]

\* EXTREME FOR THE MONTH - LAST OCCURRENCE OF  
MORE THAN ONE.  
\* TRACE AMOUNT  
\* ALSO IN AN EARLIER DATE, JR JATES.  
\* HEAVY FOG - VISIBILITY 1/4 MILE OR LESS.  
\* FIGURES FOR WIND DIRECTION ARE TENS OF DE-  
GREES CLOCKWISE FROM TRUE NORTH 70 = CALM.  
\* DATA IN COLS. 5 AND 12-15 ARE BASED ON 1/2 HR

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVALS.  
 FASTEST WIND MILE SPEEDS ARE FASTEST OBSERVED  
 ONE-MINUTE VALUES WHEN DIRECTIONS ARE IN TENS  
 OF DEGREES. THE WITH THE DIRECTION INDICATES  
 PEAK SUST. SPEED.  
 ANY ERRORS DETECTED WILL BE CORRECTED AND  
 CHANGES IN SUMMARY DATA WILL BE ANNOTATED 4  
 THE ANNUAL SUMMARY

SUMMARY BY HOURS

| AVERAGES                                             |         |       |           |                   |            |                           |                      |            |                 | RESULTANT WIND |  |
|------------------------------------------------------|---------|-------|-----------|-------------------|------------|---------------------------|----------------------|------------|-----------------|----------------|--|
| TEMPERATURE                                          |         |       |           |                   |            |                           |                      |            |                 |                |  |
| NUMBER OF<br>THERMISTERS<br>SET COVER<br>PER STATION | STATION | SHADE | AIR<br>°C | WET<br>BULB<br>°C | DWPT<br>°C | RELATIVE<br>HUMIDITY<br>% | WIND SPEED<br>M.P.H. | CORRECTION | SPEED<br>M.P.H. | DIRECTION      |  |
| 211                                                  | 31      | 30    | 251       | 421               | 411        | 401                       | 351                  |            |                 |                |  |
| 244                                                  | 31      | 30    | 241       | 421               | 411        | 391                       | 301                  | 3          | 21              | 1              |  |
| 277                                                  | 31      | 30    | 231       | 421               | 411        | 381                       | 251                  | 4          | 51              | 2              |  |
| 211                                                  | 31      | 30    | 271       | 471               | 441        | 421                       | 341                  | 1          | 251             |                |  |
| 211                                                  | 31      | 30    | 261       | 491               | 461        | 421                       | 311                  | 1          | 251             | 5              |  |
| 244                                                  | 31      | 30    | 251       | 491               | 461        | 421                       | 281                  | 2          | 251             |                |  |
| 277                                                  | 31      | 30    | 241       | 461               | 431        | 421                       | 241                  | 3          | 251             |                |  |
| 211                                                  | 31      | 30    | 231       | 431               | 411        | 401                       | 211                  | 4          | 251             |                |  |

## HOURLY PRECIPITATION WATER EQUIVALENT IN INCHES)

| OUR ENDING AT |   |   |   |   |   |   |   |   |    | OUR ENDING AT |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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noaa NATIONAL OCEANIC AND  
ATMOSPHERIC ADMINISTRATION

ENVIRONMENTAL DATA AND  
INFORMATION SERVICE

*Samuel E. Mitchell*  
DIRECTOR, NATIONAL CLIMATIC CENTER

USCOMM--NOAA--ASHEVILLE

2.

## OBSERVATIONS AT 3-HOUR INTERVALS

| HOUR | TEMPERATURE |     | WIND |       | RELATIVE HUMIDITY |      | HOUR | TEMPERATURE |     | WIND |     | RELATIVE HUMIDITY |         | HOUR | TEMPERATURE |       | WIND |     | RELATIVE HUMIDITY |       | HOUR | TEMPERATURE |      | WIND  |     | RELATIVE HUMIDITY |     |       |         |      |       |   |     |   |
|------|-------------|-----|------|-------|-------------------|------|------|-------------|-----|------|-----|-------------------|---------|------|-------------|-------|------|-----|-------------------|-------|------|-------------|------|-------|-----|-------------------|-----|-------|---------|------|-------|---|-----|---|
|      | AIR         | SEA | DIR  | SPEED | PERCENT           | WIND |      | SPEED       | AIR | SEA  | DIR | SPEED             | PERCENT |      | WIND        | SPEED | AIR  | SEA | DIR               | SPEED |      | PERCENT     | WIND | SPEED | AIR | SEA               | DIR | SPEED | PERCENT | WIND | SPEED |   |     |   |
| 1    | 50          | 50  | 0    | 0     | 100               | 0    | 1    | 50          | 50  | 0    | 0   | 100               | 0       | 1    | 50          | 50    | 0    | 0   | 100               | 0     | 1    | 50          | 50   | 0     | 0   | 100               | 0   | 1     | 50      | 50   | 0     | 0 | 100 | 0 |
| 2    | 50          | 50  | 0    | 0     | 100               | 0    | 2    | 50          | 50  | 0    | 0   | 100               | 0       | 2    | 50          | 50    | 0    | 0   | 100               | 0     | 2    | 50          | 50   | 0     | 0   | 100               | 0   | 2     | 50      | 50   | 0     | 0 | 100 | 0 |
| 3    | 50          | 50  | 0    | 0     | 100               | 0    | 3    | 50          | 50  | 0    | 0   | 100               | 0       | 3    | 50          | 50    | 0    | 0   | 100               | 0     | 3    | 50          | 50   | 0     | 0   | 100               | 0   | 3     | 50      | 50   | 0     | 0 | 100 | 0 |
| 4    | 50          | 50  | 0    | 0     | 100               | 0    | 4    | 50          | 50  | 0    | 0   | 100               | 0       | 4    | 50          | 50    | 0    | 0   | 100               | 0     | 4    | 50          | 50   | 0     | 0   | 100               | 0   | 4     | 50      | 50   | 0     | 0 | 100 | 0 |
| 5    | 50          | 50  | 0    | 0     | 100               | 0    | 5    | 50          | 50  | 0    | 0   | 100               | 0       | 5    | 50          | 50    | 0    | 0   | 100               | 0     | 5    | 50          | 50   | 0     | 0   | 100               | 0   | 5     | 50      | 50   | 0     | 0 | 100 | 0 |
| 6    | 50          | 50  | 0    | 0     | 100               | 0    | 6    | 50          | 50  | 0    | 0   | 100               | 0       | 6    | 50          | 50    | 0    | 0   | 100               | 0     | 6    | 50          | 50   | 0     | 0   | 100               | 0   | 6     | 50      | 50   | 0     | 0 | 100 | 0 |
| 7    | 50          | 50  | 0    | 0     | 100               | 0    | 7    | 50          | 50  | 0    | 0   | 100               | 0       | 7    | 50          | 50    | 0    | 0   | 100               | 0     | 7    | 50          | 50   | 0     | 0   | 100               | 0   | 7     | 50      | 50   | 0     | 0 | 100 | 0 |
| 8    | 50          | 50  | 0    | 0     | 100               | 0    | 8    | 50          | 50  | 0    | 0   | 100               | 0       | 8    | 50          | 50    | 0    | 0   | 100               | 0     | 8    | 50          | 50   | 0     | 0   | 100               | 0   | 8     | 50      | 50   | 0     | 0 | 100 | 0 |
| 9    | 50          | 50  | 0    | 0     | 100               | 0    | 9    | 50          | 50  | 0    | 0   | 100               | 0       | 9    | 50          | 50    | 0    | 0   | 100               | 0     | 9    | 50          | 50   | 0     | 0   | 100               | 0   | 9     | 50      | 50   | 0     | 0 | 100 | 0 |
| 10   | 50          | 50  | 0    | 0     | 100               | 0    | 10   | 50          | 50  | 0    | 0   | 100               | 0       | 10   | 50          | 50    | 0    | 0   | 100               | 0     | 10   | 50          | 50   | 0     | 0   | 100               | 0   | 10    | 50      | 50   | 0     | 0 | 100 | 0 |
| 11   | 50          | 50  | 0    | 0     | 100               | 0    | 11   | 50          | 50  | 0    | 0   | 100               | 0       | 11   | 50          | 50    | 0    | 0   | 100               | 0     | 11   | 50          | 50   | 0     | 0   | 100               | 0   | 11    | 50      | 50   | 0     | 0 | 100 | 0 |
| 12   | 50          | 50  | 0    | 0     | 100               | 0    | 12   | 50          | 50  | 0    | 0   | 100               | 0       | 12   | 50          | 50    | 0    | 0   | 100               | 0     | 12   | 50          | 50   | 0     | 0   | 100               | 0   | 12    | 50      | 50   | 0     | 0 | 100 | 0 |
| 13   | 50          | 50  | 0    | 0     | 100               | 0    | 13   | 50          | 50  | 0    | 0   | 100               | 0       | 13   | 50          | 50    | 0    | 0   | 100               | 0     | 13   | 50          | 50   | 0     | 0   | 100               | 0   | 13    | 50      | 50   | 0     | 0 | 100 | 0 |
| 14   | 50          | 50  | 0    | 0     | 100               | 0    | 14   | 50          | 50  | 0    | 0   | 100               | 0       | 1    |             |       |      |     |                   |       |      |             |      |       |     |                   |     |       |         |      |       |   |     |   |

11 - NG  
JNL MICHAEL J. JAMES

[illegible]

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. INDICATED IN TENS OF DEGREES FROM TRUE NORTH. 5 IS FOR EAST, 9 FOR SOUTH, 1 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS MULTIPLY BY .5 TO CONVERT TO MILES PER HOUR.

AN EQUAL OPPORTUNITY EMPLOYER

— 11 —

1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 26

100-443887-1000

**THE UNIVERSITY OF CHICAGO**

SUMMARY BY TOPICS

MORE OBSERVATIONS PER DAY AT 3-HOUR INTERVAL  
FASTEST WIND AND SPEEDS ARE FASTEST OBSERVED  
ONE-MINUTE VALUES WHEN DIRECTIONS ARE 45° NEM  
IF DEGREES. THE WITH THE DIRECTION NOTION  
PEAK WIND SPEED.

ANY ERRORS DETECTED WILL BE CORRECTED AND  
CHANGES IN SUMMARY DATA WILL BE ANNOTATED IN  
THE ANNUAL SUMMARY.

[illegible]

-DOUBLE PRECISION- RATED 500,000" IN INCHES

1.BSOPADITION PRICE \$0 TO \$99 YEAR INCLUDING ANNUAL SUMMARY ADDITION MAILING BY 35 CENTS PER MONTHLY ISSUE 10 CENTS FOR  
ANNUAL SUMMARY ISSUES 5 CENTS MINIMUM CHARGE IF \$0 TO \$99 PER ORDER OF UNPAID ISSUES OR PUBLIC AFFAIRS MAKE ISSUES PAYABLE TO DEPARTMENT OF  
COMMERCE USA SEND PAYMENTS DRAFTS AND INQUIRIES TO NATIONAL BUREAU CENTER FEDERAL BUILDING ROOM 4567 WASHINGTON NORTH CAROLINA 2880

THIS REPORT HAS BEEN OFFICIALLY PUBLISHED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND IS AVAILABLE FROM RECORDS DIVISION OF THE NATIONAL OCEANIC ADMINISTRATION, WASHINGTON, D.C. 20541

James E. McInerney  
DIRECTOR, NATIONAL CLIMATE CENTER

SCCM--4044--ASHFV: 3



APPENDIX F  
DAILY SUMMARY OF WEATHER OBSERVATIONS AT CLATSOP COUNTY AIRPORT,  
ASTORIA, OREGON, ON DATES OF BAR TRANSITS

12A

 U.S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL WEATHER SERVICE

WTSO ASTORIA, ORE

## SURFACE WEATHER OBSERVATIONS

DATE MAY 10 1978

TO CONVERT LIST TO GMT  
ADD 2 HRS. SUBTRACT

| TIME  | SKY AND CEILING | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA LEVEL PRESS. | TEMPERATURE | WIND  | WIND DIRECTION | WIND SPEED | WIND GUSTS     | WIND SQUALLS | WIND RAIN | WIND HAIL | WIND GRAPE | WIND OTHER | REMARKS AND SUPPLEMENTAL CODED DATA |
|-------|-----------------|------------|------------------------------------|------------------|-------------|-------|----------------|------------|----------------|--------------|-----------|-----------|------------|------------|-------------------------------------|
| 0056  | M280VC          | 10         |                                    | 160.49           | 42          | 25    | 04             | 000        | 103            | 1511         |           |           |            |            |                                     |
| 0157  | M280VC          | 10         |                                    | 160.49           | 41          | 28    | 06             | 000        |                |              |           |           |            |            |                                     |
| 0259  | M290VC          | 10         |                                    | 156.48           | 42          | 19    | 05             | 779        |                |              |           |           |            |            |                                     |
| 0356  | M320VC          | 12         |                                    | 157.48           | 42          | 13    | 07             | 772        | 807            | 1511         | 48        | 20001     |            |            |                                     |
| 72791 | 81307           | 67422      | 15309                              | 85551            | 66807       | 65144 | 20001          | 457480     |                |              |           |           |            |            |                                     |
| 0457  | M320VC          | 15         |                                    | 153.48           | 42          | 14    | 06             | 773        |                |              |           |           |            |            |                                     |
| 0558  | M320VC          | 12         | L-                                 | 156.48           | 42          | 17    | 07             | 779        | LD45           |              |           |           |            |            |                                     |
| 0659  | M320VC          | 7          | L-                                 |                  |             | 19    | 07             | 777        | 1505           |              |           |           |            |            |                                     |
| 0756  | M320VC          | 10         | L-                                 | 156.48           | 45          | 19    | 06             | 779        | LD45           | 10300        | 1711      |           |            |            |                                     |
| 0857  | M320VC          |            | R-F                                |                  |             | 23    | 07             | 000        |                |              |           |           |            |            |                                     |
| 0958  | M320VC          | 5          | R-F                                | 160.49           | 46          | 25    | 05             | 002        | LE8305         |              |           |           |            |            |                                     |
| 1059  | M320VC          | 5          | RW-                                | 156.49           | 46          | 18    | 07             | 559        | KE15835        |              |           |           |            |            |                                     |
| 1159  | M320VC          | 10         |                                    |                  |             | 18    | 07             | 779        | FEW CUFR 6 4ND |              |           |           |            |            |                                     |
| 1259  | M320VC          | 15         |                                    | 153.51           | 46          | 20    | 07             | 779        | FEW CUFR 6 4ND | 60203        | 1821      | 47        |            |            |                                     |
| 72791 | 82007           | 74258      | 15311                              | 68332            | 08605       | 65144 | 70800          | 20008      | 45247          | 0            |           |           |            |            |                                     |
| 1359  | M320VC          | 15         |                                    | 153.53           | 45          | 20    | 12             | 779        |                |              |           |           |            |            |                                     |
| 1459  | M320VC          | 10         | R-                                 | 149.53           | 45          | 18    | 07             | 777        | 2035           |              |           |           |            |            |                                     |
| 1559  | M320VC          | 5          | R-                                 | 149.52           | 47          | 18    | 13             | 777        | 40301          | 1721         |           |           |            |            |                                     |
| 1659  | M320VC          | 5          | R-                                 | 146.61           | 46          | 18    | 08             | 006        |                |              |           |           |            |            |                                     |
| 1759  | M320VC          | 5          | R-                                 |                  |             | 18    | 10             | 006        |                |              |           |           |            |            |                                     |
| 1859  | M320VC          | 5          | R-F                                | 143.50           | 46          | 19    | 14             | 602        | 255            |              |           |           |            |            |                                     |
| 1959  | M320VC          | 5          | R-F                                | 139.49           | 46          | 21    | 14             | 602        | 255            | 1721         | 53        |           |            |            |                                     |
| 72791 | 82114           | 68616      | 13959                              | 37422            | 03710       | 65144 | 71550          | 20026      | 45347          | 0            |           |           |            |            |                                     |
| 2059  | M320VC          | 5          | R-F                                | 136.49           | 45          | 21    | 15             | 602        | 255            |              |           |           |            |            |                                     |
| 2159  | M320VC          | 6          | R-F                                | 131.49           | 45          | 19    | 10             | 006        |                |              |           |           |            |            |                                     |
| 2259  | M320VC          |            |                                    |                  |             |       |                |            |                |              |           |           |            |            |                                     |
| 2359  | M320VC          | 3/4        | R-F                                |                  |             | 12    | 12             | 000        |                |              |           |           |            |            | (F101)                              |
| 0059  | M320VC          | 3/4        | R-F                                | 122.48           | 46          | 10    | 10             | 000        | 31710          | 1721         |           |           |            |            |                                     |
| 0159  | M320VC          | 4          | R-F                                | 119.48           | 47          | 10    | 10             | 000        | 31710          | 1721         |           |           |            |            |                                     |
| 0259  | M320VC          | 5          | R-F                                | 114.51           | 48          | 11    | 11             | 000        | 31710          | 1721         |           |           |            |            |                                     |
| 0359  | M320VC          | 7          |                                    | 109.48           | 48          | 09    | 09             | 000        |                |              |           |           |            |            |                                     |
| 0459  | M320VC          | 10         | RW-                                | 109.50           | 48          | 09    | 09             | 000        | 20008          | 45247        | 0         |           |            |            |                                     |
| 72791 | 72309           | 44206      | 10910                              | 75311            | 07307       | 65144 | 73710          | 20026      | 45347          | 0            |           |           |            |            |                                     |
| 0559  | M320VC          | 10         | RW-                                | 129.50           | 48          | 09    | 09             | 000        | 20008          | 45247        | 0         |           |            |            |                                     |
| 0659  | M320VC          | 10         |                                    | 122.48           | 45          | 21    | 09             | 002        | 255            |              |           |           |            |            |                                     |

| STATION                      |                                     | U.S. DEPARTMENT OF COMMERCE<br>NATIONAL MARINE AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |     |                                             |                        |             |            |      |               |                  |              | STATION                                       |                                     |
|------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------|-----|---------------------------------------------|------------------------|-------------|------------|------|---------------|------------------|--------------|-----------------------------------------------|-------------------------------------|
| SURFACE WEATHER OBSERVATIONS |                                     |                                                                                                           |     |                                             |                        |             |            |      |               |                  |              | WFO ASTORIA, ORE                              |                                     |
| DATE                         |                                     |                                                                                                           |     |                                             |                        |             |            |      |               |                  |              | MAY 29 1978                                   |                                     |
| TIME                         |                                     |                                                                                                           |     |                                             |                        |             |            |      |               |                  |              | TO CONVERT LIST TO GMT<br>ADD 9 HRS. SUBTRACT |                                     |
| TIME                         | SKY AND CLOUDS<br>(HOURS & PERCENT) | VISIBILITY                                                                                                |     | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP.<br>DB | DEW<br>PT. | WIND |               |                  |              | ALTIM.<br>ETER.<br>SET.                       | REMARKS AND SUPPLEMENTAL CODED DATA |
|                              |                                     | MI.                                                                                                       | SM. |                                             |                        |             |            | DIR. | SPEED<br>KTS. | VELOCITY<br>KTS. | WAVE<br>HGT. |                                               |                                     |
| R 0155                       | 20SCT 45SCT                         | 10                                                                                                        |     |                                             |                        | 29.50       | 43         | 33   | 09            |                  |              | 0411                                          | 302 1800                            |
| R 0155                       | 20SCT 45SCT                         | 10                                                                                                        |     |                                             |                        | 29.50       | 43         | 34   | 08            |                  |              | 0411                                          |                                     |
| R 0255                       | 20SCT                               | 10                                                                                                        |     |                                             |                        | 29.74       | 49         | 33   | 09            |                  |              | 0411                                          |                                     |
| R 0355                       | 20SCT                               | 10                                                                                                        |     |                                             |                        | 29.74       | 46         | 33   | 05            |                  |              | 0411                                          | 602 1100 46 20202                   |
| 72791                        | 13305                               | 26021                                                                                                     |     | 29708                                       |                        | 11500       | 06652      | 63   | 293           |                  |              | 20002                                         | 46146 10                            |
| R 0455                       | 20SCT                               | 15                                                                                                        |     |                                             |                        | 30.41       | 39         | 13   | 04            |                  |              | 0421                                          | F BUK DRUR N-E                      |
| R 0555                       | 20SCT                               | 15                                                                                                        |     |                                             |                        | 30.24       | 42         | 12   | 04            |                  |              | 0421                                          | F BUK DRUR N-E                      |
| R 0655                       | 20SCT                               | 15                                                                                                        |     |                                             |                        | 30.24       | 49         | 13   | 04            |                  |              | 0421                                          | 107 1500                            |
| R 0755                       | 20SCT 25SCT                         | 15                                                                                                        |     |                                             |                        | 30.51       | 52         | 25   | 04            |                  |              | 0421                                          |                                     |
| R 0855                       | 20SCT 25SCT                         | 15                                                                                                        |     |                                             |                        | 30.24       | 54         | 04   | 32            | 06               |              | 042                                           |                                     |
| R 0955                       | 25SCT 35SCT                         | 20                                                                                                        |     |                                             |                        | 30.31       | 56         | 46   | 36            | 04               |              | 0423                                          | 1500 1800 40                        |
| 72791                        | 13304                               | 26021                                                                                                     |     | 29513                                       |                        | 65500       | 07500      | 45   | 295           |                  |              | 45840 10                                      |                                     |
| R 1055                       | 30SCT 40SCT                         | 20                                                                                                        |     |                                             |                        | 30.01       | 57         | 46   | 32            | 11               |              | 042                                           |                                     |
| R 1155                       | 50SCT 35SCT                         | 20                                                                                                        |     |                                             |                        | 30.01       | 57         | 46   | 31            | 12               |              | 042                                           |                                     |
| R 1255                       | 30SCT 35SCT 40SCT                   | 20                                                                                                        |     |                                             |                        | 29.75       | 58         | 45   | 32            | 14               |              | 042                                           | 807 1801                            |
| R 1355                       | 35SCT                               | 20                                                                                                        |     |                                             |                        | 29.91       | 57         | 49   | 31            | 13               |              | 042                                           |                                     |
| R 1455                       | 35SCT                               | 20                                                                                                        |     |                                             |                        | 29.91       | 57         | 42   | 31            | 13               |              | 042                                           |                                     |
| R 1555                       | 35SCT                               | 20                                                                                                        |     |                                             |                        | 29.54       | 43         | 30   | 12            |                  |              | 042                                           | 302 1100 59                         |
| 72791                        | 22012                               | 26021                                                                                                     |     | 29513                                       |                        | 21600       | 06302      | 63   | 226           |                  |              | 45840 10                                      |                                     |
| R 1655                       | 45SCT                               | 20                                                                                                        |     |                                             |                        | 29.25       | 51         | 47   | 30            | 14               |              | 037                                           |                                     |
| R 1755                       | 29SCT 40SCT                         | 20                                                                                                        |     |                                             |                        | 28.95       | 54         | 43   | 31            | 12               |              | 037                                           |                                     |
| R 1855                       | 27SCT 25SCT                         | 20                                                                                                        |     |                                             |                        | 28.53       | 53         | 43   | 32            | 16               |              | 037                                           | 607 1101                            |
| R 1955                       | 26SCT 25SCT - CKN                   | 15                                                                                                        |     |                                             |                        | 28.53       | 51         | 43   | 32            | 16               |              | 037                                           |                                     |
| R 2055                       | 22SCT 25SCT - CKN                   | 15                                                                                                        |     |                                             |                        | 28.53       | 51         | 43   | 32            | 10               |              | 037                                           |                                     |
| S 2155                       | M25CCKN 25SCT                       | 15                                                                                                        |     |                                             |                        |             |            | 31   | 04            |                  |              | 037                                           | (F161)                              |
| R 2155                       | M25CCKN 25SCT                       | 15                                                                                                        |     |                                             |                        | 28.53       | 51         | 43   | 32            | 06               |              | 037                                           | 400 1508 59                         |
| 72791                        | 23006                               | 74031                                                                                                     |     | 28011                                       |                        | 65502       | 06400      | 63   | 277           |                  |              | 45940 10                                      |                                     |
| R 2255                       | M25CCKN 25SCT                       | 12                                                                                                        |     |                                             |                        | 28.53       | 50         | 42   | 31            | 05               |              | 037                                           |                                     |
| S 2355                       | 15SCT                               | 10                                                                                                        |     |                                             |                        | 29.45       | 41         | 13   | 04            |                  |              | 037                                           |                                     |

STATION

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

## SURFACE WEATHER OBSERVATIONS

DATE JUN 05 1970

TO COLLECT DATA FOR  
1600Z

| TIME    | SKY AND CEILING | VISIBILITY |       | WEATHER AND OBSTRUCTIONS TO VISION | SEA LEVEL PRESSURE | WIND |       | TEMPERATURE | RELATIVE HUMIDITY | REMARKS AND SUPPLEMENTAL CODED DATA |
|---------|-----------------|------------|-------|------------------------------------|--------------------|------|-------|-------------|-------------------|-------------------------------------|
|         |                 | SMALL      | SMALL |                                    |                    | DIR  | SPEED |             |                   |                                     |
| R 0050  | CLR             | 10         |       |                                    | 171.52             | 43   | 00    | 00          | 001               | FEW CL / 205                        |
| R 0150  | CLR             | 10         |       |                                    | 170.51             | 49   | 00    | 00          | 003               | FEW RVR 2-5                         |
| S 0200  | CLR             | 10         |       |                                    |                    |      | 00    | 00          | 003               | FEW ST 2000 RVR 2-5                 |
| R 0250  | CLR             | 10         |       |                                    | 170.51             | 49   | 00    | 00          | 003               | FEW ST 2000 RVR 2-5                 |
| R 0350  | 1 SCT           | 10         |       |                                    | 165.50             | 49   | 14    | 05          | 003               | FEW RVR 2-5 FEW ST 2000 RVR 2-5     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| R 0450  | CLR             | 10         |       |                                    | 163.50             | 46   | 00    | 00          | 003               | FEW ST 2000 RVR 2-5                 |
| R 0550  | CLR             | 10         |       |                                    | 164.52             | 40   | 16    | 04          | 003               | FEW ST 2000 RVR 2-5                 |
| R 0650  | CLR             | 15         |       |                                    | 171.52             | 35   | 12    | 13          | 004               | 003 1001                            |
| R 0750  | CLR             | 15         |       |                                    | 170.65             | 59   | 00    | 00          | 003               |                                     |
| R 0850  | 250-1000        | 15         |       |                                    | 170.69             | 61   | 02    | 04          | 003               |                                     |
| R 0950  | 250-1000        | 15         |       |                                    | 170.69             | 67   | 26    | 05          | 003               | 602 1001 49                         |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| R 1050  | 750-500         | 15         |       |                                    | 171.76             | 62   | 22    | 09          | 003               |                                     |
| R 1150  | 800-500         | 15         |       |                                    | 171.77             | 59   | 21    | 09          | 003               |                                     |
| R 1250  | 250-1000        | 15         |       |                                    | 171.77             | 59   | 25    | 10          | 003               | 400 1001                            |
| R 1350  | 250-1000        | 15         |       |                                    | 172.75             | 59   | 25    | 10          | 004               |                                     |
| R 1450  | 250-1000        | 15         |       |                                    | 170.72             | 61   | 24    | 10          | 003               |                                     |
| R 1550  | 250-1000        | 15         |       |                                    | 166.71             | 59   | 25    | 07          | 002               | 803 1001 79                         |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| R 1650  | CLR             | 5          |       |                                    | 163.70             | 37   | 12    | 06          | 001               |                                     |
| R 1750  | CLR             | 5          |       |                                    | 163.63             | 37   | 12    | 07          | 001               |                                     |
| R 1850  | 250-1000        | 15         |       |                                    | 163.64             | 50   | 24    | 07          | 001               | FEW ST 5/503 1601                   |
| R 1950  | 250-1000        | 15         |       |                                    | 160.61             | 57   | 22    | 05          | 003               | FEW ST 5/503 1601                   |
| R 2050  | 250-1000        | 10         |       |                                    | 161.52             | 55   | 00    | 00          | 001               | GF FEW ST 2000 RVR 2-5              |
| R 2150  | CLR             | 10         |       |                                    | 163.57             | 54   | 00    | 00          | 001               | 500 1070 79                         |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| S 2200  | CLR             | 10         |       |                                    |                    |      | 00    | 00          | 001               | FEW ST 4000 W F FEW ALBOS           |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| 1600 49 |                 |            |       |                                    |                    |      |       |             |                   |                                     |
| R 2350  | CLR             | 8          |       |                                    | 160.56             | 54   | 00    | 00          | 003               | FEW ST 4000 W F FEW ALBOS           |
| S 2400  | 1/2 FEW         | 4          |       |                                    |                    |      | 22    | 07          | 001               |                                     |
| R 2500  | 1/2 FEW         | 4          |       |                                    | 161.59             | 57   | 23    | 04          | 001               |                                     |



| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |       |                                   |                        |                                             |                                    |                                         |                                               |                           |                            | WFO ASTORIA, ORE           |                                              |
|------------------------------------------------------------------------------------------------------------|-------|-----------------------------------|------------------------|---------------------------------------------|------------------------------------|-----------------------------------------|-----------------------------------------------|---------------------------|----------------------------|----------------------------|----------------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |       |                                   |                        |                                             |                                    |                                         |                                               |                           |                            | DATE                       | TO CONVERT LOT TO GMT<br>ADD 8 HRS. SUBTRACT |
| TIME                                                                                                       | TIME  | SKY AND CEILING<br>HEIGHT IN FEET | VISIBILITY<br>IN MILES | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE<br>IN HG. | TEMPERATURE<br>IN DEGREES<br>FAHRENHEIT | WIND<br>DIRECTION<br>AND<br>SPEED<br>IN KNOTS | WIND<br>GUSTS<br>IN KNOTS | WIND<br>SHEARS<br>IN KNOTS | WIND<br>SHEARS<br>IN KNOTS | REMARKS AND SUPPLEMENTAL CODED DATA          |
| S 0000                                                                                                     |       | M3 OVC                            | 5                      | L-                                          |                                    |                                         | 16 05                                         |                           | 017                        |                            | CFI                                          |
| R 0000                                                                                                     |       | M3 OVC                            | 5                      | L-                                          | 720                                | 57 55                                   | 16 07                                         |                           | 018                        | 2400                       | 16//                                         |
| S 0100                                                                                                     |       | 250 M7 OVC                        | 3                      | R-F                                         |                                    |                                         | 16 06                                         |                           | 018                        |                            |                                              |
| R 0100                                                                                                     |       | 1 SCT M5 OVC                      | 3                      | R-F                                         | 722                                | 57 56                                   | 19 03                                         |                           | 019                        | LEP 2010                   |                                              |
| S 0200                                                                                                     |       | 3 SCT M3 OVC                      | 5                      | R-F                                         |                                    |                                         | 20 06                                         |                           | 019                        |                            | CFI                                          |
| R 0200                                                                                                     |       | 3 SCT M11 OVC                     | 5                      | R-F                                         | 724                                | 57 56                                   | 15 04                                         |                           | 019                        |                            |                                              |
| R 0300                                                                                                     |       | 3 SCT M15 OVC                     | 7                      | R-                                          | 726                                | 57 54                                   | 22 04                                         |                           | 020                        | 10504                      | 16// 57 55 54                                |
| A 0400                                                                                                     | 72791 | 57204                             | 61619                  | 22614                                       | 58211                              | 61105                                   | 63217                                         | 70160                     | 20004                      | 465570                     |                                              |
| R 0400                                                                                                     |       | 20000 150 OVC                     | 10                     |                                             | 727                                | 57 55                                   | 15 04                                         |                           | 021                        | REI FFW STEA 2-50          |                                              |
| R 0500                                                                                                     |       | M12 M12 250 OVC                   | 10                     |                                             | 734                                | 55 55                                   | 14 03                                         |                           | 022                        | FEW CURT 3100 15-55        |                                              |
| R 0600                                                                                                     |       | M12 M12 250 OVC                   | 15                     |                                             | 737                                | 60 56                                   | 25 04                                         |                           | 023                        | FEW CURT 3100 15-55        |                                              |
| R 0700                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             | 241                                | 61 55                                   | 28 06                                         |                           | 024                        |                            |                                              |
| R 0800                                                                                                     |       | M22 OCN 250 OCN                   | 15                     |                                             | 241                                | 62 55                                   | 24 04                                         |                           | 024                        |                            |                                              |
| R 0900                                                                                                     |       | M25 OCN 250 OCN                   | 15                     |                                             | 246                                | 62 55                                   | 27 09                                         |                           | 024                        | 3053 1508 57               |                                              |
| A 0900                                                                                                     | 72791 | 67709                             | 74022                  | 24617                                       | 55509                              | 63237                                   | 70004                                         | 465570                    | 70004                      | 465570                     | 70004                                        |
| R 1000                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             | 251                                | 65 55                                   | 24 06                                         |                           | 027                        |                            |                                              |
| S 1100                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             |                                    |                                         | 24 07                                         |                           | 027                        |                            |                                              |
| R 1100                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             | 251                                | 65 55                                   | 24 12                                         |                           | 027                        |                            |                                              |
| R 1200                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             | 251                                | 67 55                                   | 20 12                                         |                           | 027                        | 105 1901                   |                                              |
| R 1300                                                                                                     |       | M16 OCN 250 OCN                   | 15                     |                                             | 251                                | 66 55                                   | 21 08                                         |                           | 027                        |                            |                                              |
| R 1400                                                                                                     |       | 250 - OVC                         | 20                     |                                             | 249                                | 68 56                                   | 29 08                                         |                           | 026                        | FEW CU                     |                                              |
| R 1500                                                                                                     |       | 250 - OVC                         | 20                     |                                             | 244                                | 67 55                                   | 32 09                                         |                           | 026                        | 807 1107 68                |                                              |
| A 1500                                                                                                     | 72791 | 80021                             | 24414                  | 11507                                       | 13807                              | 63235                                   | 70004                                         | 465570                    |                            |                            |                                              |
| R 1600                                                                                                     |       | 250 - OVC                         | 20                     |                                             | 244                                | 65 53                                   | 28 11                                         |                           | 025                        |                            |                                              |
| R 1700                                                                                                     |       | 250 - OVC                         | 20                     |                                             | 241                                | 64 53                                   | 28 12                                         |                           | 024                        |                            |                                              |
| R 1800                                                                                                     |       | 250 - OCN                         | 20                     |                                             | 241                                | 62 53                                   | 29 03                                         |                           | 024                        | 603 1008                   |                                              |
| R 1900                                                                                                     |       | 250 - OCN                         | 20                     |                                             | 241                                | 62 53                                   | 29 07                                         |                           | 024                        |                            |                                              |
| R 2000                                                                                                     |       | 15 SCT 250 SCT                    | 15                     |                                             | 242                                | 62 53                                   | 33 11                                         |                           | 025                        |                            |                                              |
| R 2100                                                                                                     |       | 15 SCT 250 SCT                    | 15                     |                                             | 242                                | 62 54                                   | 33 09                                         |                           | 025                        | 102 1501 67                |                                              |
| A 2100                                                                                                     | 72791 | 53209                             | 46021                  | 24218                                       | 25101                              | 13102                                   | 63234                                         | 70004                     | 465570                     |                            |                                              |
| R 2200                                                                                                     |       | 12 SCT                            | 10                     |                                             | 241                                | 64 53                                   | 33 27                                         |                           | 024                        |                            |                                              |
| R 2300                                                                                                     |       | 12 SCT                            | 10                     |                                             | 237                                | 54 57                                   | 24 03                                         |                           | 022                        |                            |                                              |

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                                   |                     |           |                                             |                                 |             |     |           |       | STATION<br>WSO ASTORIA, ORE |                                                     |
|------------------------------------------------------------------------------------------------------------|-----------------------------------|---------------------|-----------|---------------------------------------------|---------------------------------|-------------|-----|-----------|-------|-----------------------------|-----------------------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |                                   |                     |           |                                             |                                 |             |     |           |       | DATE<br>JUN 21 1978         | TO CORRECT SET TO SET<br>ADD <u>8</u> MIN. SUBTRACT |
| TIME                                                                                                       | SKY AND CEILING<br>Height in feet | VISIBILITY<br>Miles |           | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE<br>mm. | TEMPERATURE |     | WIND      |       | ALTITUDE<br>FEET            | REMARKS AND SUPPLEMENTAL CODED DATA                 |
|                                                                                                            |                                   | Observed            | Corrected |                                             |                                 | Air         | Sea | Direction | Speed |                             |                                                     |
| R 0056                                                                                                     | E 17 OVC                          | 10                  |           |                                             | 190.56                          | 50.32       | 04  | 009       | 803   | 15//                        |                                                     |
| R 0157                                                                                                     | E 17 OVC                          | 10                  |           |                                             | 188.56                          | 50.21       | 06  | 009       |       |                             |                                                     |
| R 0257                                                                                                     | E 19 OVC                          | 10                  |           |                                             | 187.57                          | 50.17       | 05  | 008       |       |                             |                                                     |
| R 0355                                                                                                     | E 18 OVC                          | 10                  |           |                                             | 188.56                          | 50.17       | 04  | 009       | 502   | 15// 55                     |                                                     |
| // 72791 812.4 66022 18813 854// 10502 63130 46755 0                                                       |                                   |                     |           |                                             |                                 |             |     |           |       |                             |                                                     |
| R 0457                                                                                                     | E 12 OVC                          | 10                  |           |                                             | 190.56                          | 50.18       | 04  | 009       |       |                             |                                                     |
| R 0558                                                                                                     | E 14 OVC                          | 10                  |           |                                             | 190.56                          | 50.19       | 06  | 009       |       |                             |                                                     |
| R 0658                                                                                                     | E 13 OVC                          | 10                  |           |                                             | 190.57                          | 50.26       | 04  | 011       | 307   | 15//                        |                                                     |
| R 0758                                                                                                     | M 15 OVC                          | 10                  |           |                                             | 200.57                          | 51.27       | 05  | 012       |       |                             |                                                     |
| R 0858                                                                                                     | M 15 OVC                          | 10                  |           |                                             | 200.59                          | 53.25       | 05  | 012       | 541   | BKN OVC                     |                                                     |
| R 0958                                                                                                     | M 15 OVC                          | 12                  |           |                                             | 200.61                          | 53.23       | 08  | 012       | 541   | BKN OVC                     |                                                     |
| // 72791 72308 69022 20016 75455 12105 63191 46755 0                                                       |                                   |                     |           |                                             |                                 |             |     |           |       |                             |                                                     |
| R 1058                                                                                                     | M 15 OVC                          | 12                  |           |                                             | 200.61                          | 53.24       | 10  | 013       | 541   | BKN OVC                     |                                                     |
| R 1158                                                                                                     | M 15 OVC                          | 10                  |           |                                             | 200.62                          | 53.21       | 09  | 013       | 541   | BKN OVC                     |                                                     |
| S 1258                                                                                                     | 4 OVC                             | 8                   |           | L-                                          |                                 |             | 05  | 013       | 541   | BKN OVC                     |                                                     |
| R 1358                                                                                                     | 4 OVC                             | 5                   |           | L-                                          |                                 |             | 08  | 013       | 541   | BKN OVC                     |                                                     |
| R 1458                                                                                                     | 4 OVC                             | 10                  |           |                                             | 200.61                          | 54.25       | 10  | 014       | 541   | BKN OVC                     |                                                     |
| R 1558                                                                                                     | 4 OVC                             | 10                  |           |                                             | 200.61                          | 54.24       | 07  | 013       | 541   | BKN OVC                     |                                                     |
| // 72791 82407 66025 20416 854// 12802 63195 70030 46655 0                                                 |                                   |                     |           |                                             |                                 |             |     |           |       |                             |                                                     |
| R 1658                                                                                                     | 4 OVC                             | 8                   |           | RW-                                         | 200.59                          | 54.23       | 08  | 012       | 541   | BKN OVC                     |                                                     |
| S 1758                                                                                                     | 4 OVC                             | 10                  |           |                                             |                                 |             | 07  | 012       | 541   | BKN OVC                     |                                                     |
| R 1857                                                                                                     | 4 OVC                             | 4                   |           | RW-F                                        | 200.58                          | 54.24       | 08  | 012       | 541   | BKN OVC                     |                                                     |
| R 1957                                                                                                     | 4 OVC                             | 7                   |           |                                             | 200.57                          | 54.23       | 07  | 012       | 541   | BKN OVC                     |                                                     |
| // 72791 82605 58908 19712 852// 11403 63193 70010 46654 0                                                 |                                   |                     |           |                                             |                                 |             |     |           |       |                             |                                                     |
| R 2057                                                                                                     | M 21 OVC                          | 10                  |           |                                             | 197.54                          | 52.24       | 03  | 010       | 541   | BKN OVC                     |                                                     |
| R 2154                                                                                                     | M 19 OVC                          | 5                   |           | RW-F                                        | 197.54                          | 52.26       | 05  | 011       | 541   | BKN OVC                     |                                                     |
| // 72791 82605 58908 19712 852// 11403 63193 70010 46654 0                                                 |                                   |                     |           |                                             |                                 |             |     |           |       |                             |                                                     |
| R 2252                                                                                                     | M 22 OVC                          | 10                  |           |                                             | 193.54                          | 52.24       | 03  | 010       | 541   | BKN OVC                     |                                                     |
| R 2357                                                                                                     | 15 OVC                            | 10                  |           |                                             | 192.55                          | 52.30       | 06  | 010       |       |                             |                                                     |

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |       |                                     |                       |            |                                             |                        |            |           |                          | STATION<br>WSO ASTORIA, ORE                  |                    |                                     |
|------------------------------------------------------------------------------------------------------------|-------|-------------------------------------|-----------------------|------------|---------------------------------------------|------------------------|------------|-----------|--------------------------|----------------------------------------------|--------------------|-------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |       |                                     |                       |            |                                             |                        |            |           |                          | DATE<br>JUN 23 1978                          |                    |                                     |
|                                                                                                            |       |                                     |                       |            |                                             |                        |            |           |                          | TO CONVERT LST TO GMT<br>ADD 8 HRS. SUBTRACT |                    |                                     |
| TIME                                                                                                       | TIME  | SKY AND CEILING<br>(Height in feet) | VISIBILITY<br>(Miles) |            | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP<br>BY | DEW<br>PT | WIND<br>SPEED<br>(Knots) | WIND<br>DIRECTION                            | ALTITUDE<br>(Feet) | REMARKS AND SUPPLEMENTAL CODED DATA |
|                                                                                                            |       |                                     | Actual                | Unobscured |                                             |                        |            |           |                          |                                              |                    |                                     |
| R                                                                                                          | 0456  | E 20 LKN 55 OVC                     | 8                     |            | NW-                                         | 16.1                   | 53.50      | 12.04     | 001                      | 1830                                         | 60300              | 15 //                               |
| R                                                                                                          | 0158  | 30 SCT E 50 BKN                     | 10                    |            |                                             | 16.1                   | 52.49      | 08.03     | 001                      | RE40                                         |                    |                                     |
| R                                                                                                          | 0258  | E 20 LKN                            | 10                    |            |                                             | 16.3                   | 51.49      | 14.03     | 001                      |                                              |                    |                                     |
| R                                                                                                          | 0358  | 30 SCT E 50 BKN                     | 10                    |            |                                             | 16.5                   | 50.49      | 12.04     | 002                      | 30300                                        | 1500               | 50 20001                            |
| /                                                                                                          | 72791 | 51204                               | 46.028                | 16510      | 55500                                       | 07303                  | 63156      | 70030     | 20001                    | 46450                                        | 0                  |                                     |
| R                                                                                                          | 0458  | 15 SCT E 50 BKN                     | 10                    |            |                                             | 16.6                   | 50.49      | 10.04     | 002                      |                                              |                    |                                     |
| R                                                                                                          | 0558  | 10 SCT E 50 BKN                     | 10                    |            |                                             | 17.1                   | 52.47      | 09.03     | 004                      |                                              |                    |                                     |
| R                                                                                                          | 0658  | 15 SCT E 40 BKN                     | 15                    |            |                                             | 17.5                   | 54.51      | 11.04     | 005                      | 310                                          | 1800               |                                     |
| R                                                                                                          | 0758  | 16 SCT E 50 BKN 25 FKN              | 15                    |            |                                             | 18.0                   | 57.50      | 12.04     | 006                      |                                              |                    |                                     |
| R                                                                                                          | 0858  | 19 SCT E 45 FKN                     | 15                    |            |                                             | 18.2                   | 59.49      | 14.03     | 007                      |                                              |                    |                                     |
| R                                                                                                          | 0958  | 19 SCT E 45 FKN                     | 15                    |            |                                             | 18.3                   | 62.48      | 03.03     | 007                      | 103                                          | 1800               | 50                                  |
| /                                                                                                          | 72791 | 60203                               | 74022                 | 13317      | 63400                                       | 09103                  | 63174      | 66450     | 0                        |                                              |                    |                                     |
| R                                                                                                          | 1058  | 20 SCT E 45 FKN                     | 15                    |            |                                             | 18.7                   | 59.50      | 23.06     | 009                      |                                              |                    |                                     |
| R                                                                                                          | 1158  | 19 SCT E 40 BKN                     | 10                    |            |                                             | 18.7                   | 62.51      | 22.06     | 009                      |                                              |                    |                                     |
| R                                                                                                          | 1258  | 23 SCT E 45 FKN                     | 15                    |            |                                             | 18.8                   | 65.52      | 25.05     | 009                      | 305                                          | 1800               |                                     |
| R                                                                                                          | 1358  | 20 SCT E 50 BKN                     | 15                    |            |                                             | 19.0                   | 64.50      | 26.05     | 009                      |                                              |                    |                                     |
| R                                                                                                          | 1458  | 38 SCT E 50 BKN                     | 15                    |            |                                             | 19.2                   | 65.51      | 24.12     | 010                      |                                              |                    |                                     |
| /                                                                                                          | 70111 |                                     |                       |            |                                             |                        |            |           |                          |                                              |                    |                                     |
| R                                                                                                          | 1558  | E 50 BKN                            | 15                    |            |                                             | 19.3                   | 62.50      | 26.12     | 010                      | 205                                          | 1800               | 67                                  |
| /                                                                                                          | 72791 | 62612                               | 74022                 | 19317      | 69500                                       | 10205                  | 63185      | 46750     | 0                        |                                              |                    |                                     |
| R                                                                                                          | 1658  | E 32 BKN                            | 15                    |            |                                             | 19.3                   | 62.49      | 24.07     | 010                      | RMK DSNT SE                                  |                    |                                     |
| R                                                                                                          | 1758  | M 33 OVC                            | 15                    |            |                                             | 19.0                   | 59.49      | 23.05     | 009                      |                                              |                    |                                     |
| R                                                                                                          | 1858  | M 38 OVC                            | 15                    |            |                                             | 19.3                   | 58.49      | 24.04     | 010                      | RMK 5-SW/500 1800                            |                    |                                     |
| R                                                                                                          | 1958  | M 38 OVC                            | 15                    |            |                                             | 19.3                   | 58.50      | 23.03     | 010                      | RMK                                          |                    |                                     |
| R                                                                                                          | 2058  | E 38 BKN                            | 10                    |            |                                             | 19.3                   | 57.50      | 18.03     | 010                      |                                              |                    |                                     |
| R                                                                                                          | 2158  | E 50 BKN                            | 10                    |            |                                             | 19.5                   | 56.50      | 20.03     | 011                      | 302                                          | 1500               | 67                                  |
| /                                                                                                          | 72791 | 72003                               | 66022                 | 19513      | 75500                                       | 10302                  | 63186      | 46750     | 0                        |                                              |                    |                                     |
| R                                                                                                          | 2258  | E 50 OVC                            | 10                    |            |                                             | 19.5                   | 55.50      | 18.04     | 010                      | RMK                                          |                    |                                     |
| R                                                                                                          | 2358  | 70 SCT                              | 12                    |            |                                             | 19.2                   | 55.50      | 15.03     | 010                      |                                              |                    |                                     |

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                               | WSO ASTORIA, ORE                             |                                          |
|------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------|------------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |                               |                                              |                                          |
| DATE<br>JUN 21 1978                                                                                        |                               | TO CORRECT SET TO GAT<br>ADD 2 Hrs. SUBTRACT |                                          |
| TIME                                                                                                       | SKY AND CLOUDS<br>Clouds in % | VISIBILITY<br>mi ft                          | WEATHER AND<br>OBSTRUCTIONS<br>TO VISION |
| R 0000 705KT                                                                                               | 12                            |                                              | 1905047 18 04                            |
| R 0100 705KT                                                                                               | 12                            |                                              | 1904947 13 04                            |
| R 0200 705KT                                                                                               | 12                            |                                              | 1904844 11 05                            |
| R 0300 705KT                                                                                               | 15                            |                                              | 1904749 10 03                            |
| 72791 21003 74021 19008 15530 07400 63181 46747(D)                                                         |                               |                                              |                                          |
| R 0400 2305KT                                                                                              | 20                            |                                              | 1904645 12 04                            |
| R 0500 185KT 1000 20                                                                                       | 20                            |                                              | 1954947 10 03                            |
| SET                                                                                                        |                               |                                              |                                          |
| R 0600 175KT 550 100 20                                                                                    | 20                            |                                              | 1935343 00 00                            |
| SET 2305KT                                                                                                 |                               |                                              |                                          |
| R 0700 175KT 550 100 20                                                                                    | 20                            |                                              | 1975951 23 05                            |
| R 0800 225KT 435 100 25                                                                                    | 25                            |                                              | 2006050 26 05                            |
| R 0900 275KT 400 235 25                                                                                    | 25                            |                                              | 2046451 25 07                            |
| 72791 22507 32020 20418 23501 11210 63195 467460                                                           |                               |                                              |                                          |
| R 1000 225KT 450 125 25                                                                                    | 25                            |                                              | 2076452 24 09                            |
| R 1100 225KT 450 100 25                                                                                    | 25                            |                                              | 2106551 24 10                            |
| R 1200 250KT 450 100 25                                                                                    | 25                            |                                              | 2146750 25 12                            |
| R 1300 255KT 450 100 25                                                                                    | 25                            |                                              | 2176250 25 03                            |
| 25 25                                                                                                      |                               |                                              |                                          |
| R 1400 205KT 450 100 25                                                                                    | 25                            |                                              | 2206551 25 11                            |
| R 1500 225KT 450 100 25                                                                                    | 25                            |                                              | 2246550 24 10                            |
| 72791 22410 22020 22412 28501 10210 63215 467460                                                           |                               |                                              |                                          |
| R 1600 225KT 450 100 25                                                                                    | 25                            |                                              | 2266350 24 11                            |
| R 1700 195KT 325 250 25                                                                                    | 25                            |                                              | 2276251 28 10                            |
| R 1800 195KT 335 250 25                                                                                    | 25                            |                                              | 2276050 24 09                            |
| R 1900 195KT 38 50 20                                                                                      | 20                            |                                              | 2295850 27 05                            |
| 905KT E2000                                                                                                |                               |                                              |                                          |
| R 2000 E250 30N                                                                                            | 12                            |                                              | 2315549 23 04                            |
| R 2100 E200 30N                                                                                            | 12                            |                                              | 2315549 22 03                            |
| 72791 62023 69021 23113 12406 09103 63222 467460                                                           |                               |                                              |                                          |
| R 2200 165KT 420 30N                                                                                       | 12                            |                                              | 2315550 19 03                            |
| R 2300 165KT 420 30N                                                                                       | 12                            |                                              | 2315150 13 04                            |
| 231                                                                                                        |                               |                                              |                                          |



NOV 4 1978

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 4 1978 TO CONVERT LST TO GST ADD 8 HRS. SUBTRACT

| TIME | SKY AND CLOUDS<br>(Amount, Height, Type) | VISIBILITY<br>(Miles) | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS.<br>(Inches) | TEMPERATURE<br>(Fahrenheit) | WIND<br>(Direction, Speed) | ALTITUDE<br>(Feet) | REMARKS AND SUPPLEMENTAL CODED DATA |
|------|------------------------------------------|-----------------------|---------------------------------------------|------------------------------------|-----------------------------|----------------------------|--------------------|-------------------------------------|
| 0000 | 0-100 000                                | 10                    | RW-                                         | 214.46                             | 45                          | 26.15 229                  | 016                | 27510 1511                          |
| 0056 | M223KN 323KN                             | 12                    | RW-                                         | 217.49                             | 44                          | 22.11                      | 017                | 220KN V SCT                         |
| 0100 | 22 SCT 38 SCT                            | 12                    |                                             |                                    |                             | 30.12 617                  | 018                |                                     |
| 0205 | 22 SCT 38 SCT                            | 12                    |                                             | 227.49                             | 43                          | 26.09                      | 020                | RE 10                               |
| 0303 | M223KN                                   | 12                    |                                             | 241.50                             | 45                          | 29.15                      | 024                | 22711 1500 42 20102                 |
| 0400 | 72791 62915 69032                        | 24110                 | 65500                                       | 07227                              | 63222                       | 71120                      | 20102              | 46048M                              |
| 0456 | M223KN 323KN                             | 12                    |                                             | 258.50                             | 40                          | 33.15                      | 039                | BINGUL                              |
| 0500 | M223KN 323KN                             | 12                    |                                             | 271.47                             | 40                          | 32.03                      | 033                |                                     |
| 0600 | CLR                                      | 12                    |                                             |                                    |                             | 36.07                      | 034                |                                     |
| 0654 | CLR                                      | 12                    |                                             | 275.47                             | 37                          | 36.09                      | 034                | 234 1500                            |
| 0755 | M343KN                                   | 15                    |                                             | 283.44                             | 40                          | 34.03                      | 037                |                                     |
| 0858 | 25 SCT 40 SCT 250 SCT                    | 15                    |                                             | 300.50                             | 39                          | 32.08                      | 042                |                                     |
| 0959 | 25 SCT 40 SCT 250 SCT                    | 15                    |                                             | 302.51                             | 39                          | 30.12                      | 042                | 127 1301 44                         |
| 1000 | 72791 73012 74431                        | 30211                 | 38501                                       | 04127                              | 63293                       | 20067                      | 45044              | 0                                   |
| 1058 | 25 SCT 250 SCT                           | 20                    |                                             | 397.53                             | 40                          | 34.09                      | 041                |                                     |
| 1159 | 30 SCT 250 SCT                           | 20                    |                                             | 397.53                             | 38                          | 32.10                      | 041                |                                     |
| 1259 | 30 SCT 250 SCT                           | 20                    |                                             | 398.54                             | 40                          | 31.13                      | 041                | 503 1101                            |
| 1359 | 30 SCT 250 SCT                           | 20                    |                                             | 398.53                             | 37                          | 30.10                      | 041                |                                     |
| 1459 | 30 SCT 250 SCT                           | 20                    |                                             | 398.53                             | 37                          | 32.10                      | 040                |                                     |
| 1559 | 30 SCT 250 SCT                           | 20                    |                                             | 398.51                             | 37                          | 31.10                      | 041                | 500 1136 54                         |
| 1600 | 72791 73110 74021                        | 29211                 | 11536                                       | 23560                              | 63290                       | 20065                      | 45444              | 0                                   |
| 1658 | 205 1005 250 1005                        | 15                    |                                             | 302.48                             | 38                          | 32.09                      | 042                |                                     |
| 1757 | 205 1005 250 1005                        | 15                    |                                             | 300.48                             | 39                          | 31.05                      | 042                |                                     |
| 1858 | 205 1005 250 1005                        | 15                    |                                             | 302.46                             | 37                          | 25.05                      | 042                | 003 1331                            |
| 1958 | 205 1005 250 1005                        | 15                    |                                             | 299.40                             | 37                          | 12.06                      | 041                |                                     |
| 2057 | 205 1005 250 1005                        | 15                    |                                             | 302.33                             | 35                          | 12.05                      | 042                |                                     |
| 2158 | 205 1005 250 1005                        | 12                    |                                             | 302.38                             | 35                          | 12.06                      | 042                | 500 1101 54                         |
| 2200 | 72791 31036 69021                        | 30203                 | 11501                                       | 02507                              | 63293                       | 20011                      | 454380             |                                     |
| 2257 | 250 SCT                                  | 12                    |                                             | 295.26                             | 34                          | 11.06                      | 042                |                                     |
| 2357 | 250 SCT                                  | 12                    |                                             | 295.26                             | 34                          | 09.04                      | 042                | PFLHY F                             |

WFO-10A  
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U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 9 1978

TO CONVERT SET TO GMT  
ADD 8 HRS. SUBTRACT

| TIME | SKY AND CEILING<br>(Height in Feet) | VISIBILITY   |             | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP. | DEW<br>PT. | WIND |       | ALTIM.<br>ETER.<br>SETTING | REMARKS AND SUPPLEMENTAL CODED DATA                               |
|------|-------------------------------------|--------------|-------------|---------------------------------------------|------------------------|-------|------------|------|-------|----------------------------|-------------------------------------------------------------------|
|      |                                     | SMALL CLOUDS | TO 1000 FT. |                                             |                        |       |            | DIR. | SPEED |                            |                                                                   |
| 0057 | 23 SCT 40 SCT                       | 10           |             |                                             | 251                    | 37    | 35         | 13   | 04    | 027                        | 40003 1800                                                        |
| 0157 | 23 SCT 45 DKN                       | 10           |             |                                             | 351                    | 37    | 34         | 05   | 07    | 027                        | 4020640                                                           |
| 0258 | 23 SCT 45 DKN                       | 10           |             | NW-                                         | 251                    | 40    | 36         | 15   | 07    | 027                        | 4015                                                              |
| 0357 | 23 SCT 45 SCT                       | 10           |             |                                             | 251                    | 37    | 34         | 00   | 00    | 027                        | 40004 1800 36 30008                                               |
| 0457 | 23 SCT 45 SCT                       | 10           |             |                                             | 254                    | 34    | 32         | 12   | 05    | 028                        | 40000 46253 25103 48500 01400 63042 70423 20008 45336 ICE PELLETS |
| 0556 | 23 SCT 45 SCT                       | 8            |             |                                             | 256                    | 35    | 33         | 13   | 03    | 029                        | 20114 F                                                           |
| 0656 | 23 SCT 45 SCT                       | 8            |             |                                             | 257                    | 35    | 32         | 08   | 04    | 030                        | 20114 F 308 1800                                                  |
| 0758 | 7 SCT                               | 10           |             |                                             | 264                    | 34    | 32         | 12   | 06    | 031                        |                                                                   |
| 0856 | CLR                                 | 15           |             |                                             | 270                    | 29    | 37         | 11   | 05    | 033                        | FW AT 7000                                                        |
| 0956 | CLR                                 | 15           |             |                                             | 275                    | 42    | 36         | 11   | 05    | 034                        | FW AT 1100 245                                                    |
| 1057 | 11105 74020                         | 20           |             |                                             | 275                    | 46    | 34         | 05   | 09    | 035                        | FW AT 1100 245                                                    |
| 1156 | CLR                                 | 20           |             |                                             | 271                    | 47    | 37         | 07   | 05    | 033                        | FW AT 1100                                                        |
| 1256 | 23 SCT                              | 20           |             |                                             | 268                    | 49    | 33         | 05   | 07    | 032                        | FW AT 1100                                                        |
| 1356 | CLR                                 | 20           |             |                                             | 264                    | 49    | 31         | 03   | 11    | 031                        | FW AT 1100                                                        |
| 1456 | 30 SCT                              | 20           |             |                                             | 264                    | 49    | 31         | 36   | 09    | 031                        |                                                                   |
| 1556 | 30 SCT                              | 20           |             |                                             | 263                    | 48    | 30         | 01   | 01    | 031                        | FW AT 1500 49                                                     |
| 1657 | 20104 60000                         | 20           |             |                                             | 263                    | 48    | 30         | 01   | 01    | 031                        | FW AT 1500 49                                                     |
| 1755 | 20 SCT                              | 15           |             |                                             | 261                    | 45    | 27         | 33   | 13    | 030                        |                                                                   |
| 1854 | 20 SCT                              | 12           |             |                                             | 261                    | 44    | 25         | 36   | 11    | 030                        |                                                                   |
| 1956 | CLR                                 | 12           |             |                                             | 261                    | 40    | 25         | 24   | 10    | 030                        | 402 1400                                                          |
| 2054 | CLR                                 | 12           |             |                                             | 263                    | 43    | 29         | 24   | 10    | 031                        |                                                                   |
| 2157 | CLR                                 | 12           |             |                                             | 262                    | 34    | 30         | 13   | 05    | 032                        |                                                                   |
| 2256 | CLR                                 | 12           |             |                                             | 264                    | 32    | 20         | 13   | 04    | 031                        | F FW AT 1500 49                                                   |
| 2357 | 11304 60020                         | 20           |             |                                             | 264                    | 32    | 20         | 12   | 03    | 031                        | F FW AT 1500 49                                                   |
| 2456 | CLR                                 | 12           |             |                                             | 261                    | 30    | 27         | 07   | 04    | 030                        | F FW AT 1500 49                                                   |

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U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 10 1978

TO 0000Z, 0100Z, 0200Z, 0300Z, 0400Z, 0500Z, 0600Z, 0700Z, 0800Z, 0900Z, 1000Z, 1100Z, 1200Z, 1300Z, 1400Z, 1500Z, 1600Z, 1700Z, 1800Z, 1900Z, 2000Z, 2100Z, 2200Z, 2300Z, 2400Z

| TIME        | SKY AND CLOUDS<br>(FEET, MILES, PERCENT) | VISIBILITY |       | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE | TEMPERATURE | WIND  | HUMIDITY | DEW<br>POINT | REMARKS AND SUPPLEMENTAL CODED DATA |
|-------------|------------------------------------------|------------|-------|---------------------------------------------|--------------------------|-------------|-------|----------|--------------|-------------------------------------|
|             |                                          | STATUTE    | MILES |                                             |                          |             |       |          |              |                                     |
| R 0057      | CLR                                      | 10         |       |                                             | 261.55                   | 27          | 13 05 | 030      |              | 603                                 |
| N 0156      | CLR                                      | 10         |       |                                             | 261.29                   | 26          | 13 05 | 030      |              |                                     |
| R 0256      | CLR                                      | 10         |       |                                             | 261.33                   | 27          | 11 03 | 030      |              |                                     |
| R 0355      | CLR                                      | 10         |       |                                             | 264.55                   | 29          | 07 06 | 031      |              | 303 29                              |
| 72791 00706 | 06000                                    | 26.40      | 20970 | 52303                                       | 63256                    | 44929       |       |          |              |                                     |
| R 0456      | CLR                                      | 10         |       |                                             | 266.32                   | 28          | 07 07 | 032      |              |                                     |
| N 0556      | CLR                                      | 10         |       |                                             | 268.36                   | 28          | 05 10 | 032      |              |                                     |
| N 0656      | CLR                                      | 15         |       |                                             | 271.35                   | 27          | 09 05 | 033      |              | 207 1500                            |
| R 0756      | CLR                                      | 15         |       |                                             | 275.38                   | 27          | 07 10 | 034      |              |                                     |
| R 0856      | CLR                                      | 25         |       |                                             | 281.38                   | 27          | 12 05 | 036      |              |                                     |
| R 0956      | CLR                                      | 25         |       |                                             | 281.42                   | 27          | 04 16 | 026      |              | 110 29                              |
| 72791 00416 | 32020                                    | 29106      | 00920 | 53110                                       | 63273                    | 442290      |       |          |              |                                     |
| R 1055      | CLR                                      | 25         |       |                                             | 281.43                   | 24          | 07 14 | 036      |              |                                     |
| R 1157      | CLR                                      | 25         |       |                                             | 278.45                   | 23          | 03 14 | 035      |              | FEW CL NW-NF                        |
| R 1256      | CLR                                      | 25         |       |                                             | 269.40                   | 23          | 07 17 | 032      |              | 814 1100                            |
| R 1356      | CLR                                      | 25         |       |                                             | 264.45                   | 22          | 05 16 | 021      |              | FEW CL                              |
| R 1457      | CLR                                      | 25         |       |                                             | 263.44                   | 20          | 04 18 | 022      |              | FEW CL B-605                        |
| R 1556      | CLR                                      | 25         |       |                                             | 264.48                   | 18          | 04 19 | 023      |              | 503 45                              |
| 72791 00419 | 32020                                    | 26400      | 00970 | 52502                                       | 63256                    | 445290      |       |          |              |                                     |
| R 1655      | CLR                                      | 35         |       |                                             | 268.41                   | 18          | 05 19 | 022      |              | 0626/06                             |
| R 1755      | CLR                                      | 15         |       |                                             | 270.40                   | 18          | 05 19 | 022      |              | 033                                 |
| R 1855      | CLR                                      | 15         |       |                                             | 275.40                   | 18          | 05 12 | 016      |              | 034 310                             |
| R 1955      | CLR                                      | 15         |       |                                             | 275.40                   | 19          | 05 15 | 034      |              |                                     |
| R 2055      | CLR                                      | 15         |       |                                             | 276.39                   | 19          | 06 13 | 035      |              |                                     |
| R 2155      | CLR                                      | 15         |       |                                             | 278.39                   | 19          | 10 11 | 035      |              | 303 45                              |
| 72791 01011 | 74020                                    | 27804      | 00900 | 52503                                       | 63269                    | 445290      |       |          |              |                                     |
| R 2207      | CLR                                      | 15         |       |                                             | 271.33                   | 18          | 08 08 | 033      |              |                                     |
| R 2355      | CLR                                      | 15         |       |                                             | 270.33                   | 16          | 11 06 | 033      |              |                                     |



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U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE NOV 28 1973 TO COLLECT LOT TO GWT  
ADD 8 PER SUBTRACT

| TIME   | SKY AND CEILING<br>Height in Feet | VISIBILITY<br>Miles | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS | TEMP<br>F | DEW<br>PT<br>F | WIND<br>DIRECTION<br>SPEED<br>GUSTS | ALT<br>METER<br>SECT<br>TIME | REMARKS AND SUPPLEMENTAL CODED DATA |
|--------|-----------------------------------|---------------------|---------------------------------------------|-----------------------|-----------|----------------|-------------------------------------|------------------------------|-------------------------------------|
| R 0056 | M 1 OVC                           | 3                   | F                                           | 207.42                | 40        | 00             | 20                                  | 014                          | 3150 16 //                          |
| S 0117 | M 1 OVC                           | 1                   | L-F                                         |                       |           | 00             | 00                                  | 015                          |                                     |
| S 0142 | W 1 X                             | 1/2                 | F                                           |                       |           | 00             | 05                                  | 015                          | (FIRI)                              |
| R 0156 | W 1 X                             | 1/2                 | F                                           | 210                   | 41        | 00             | 06                                  | 015                          | LRH 240                             |
| R 0256 | W 1 X                             | 1/2                 | R-F                                         | 210                   | 42        | 00             | 03                                  | 015                          | R 305                               |
| S 0341 | M 2 OVC                           | 2                   | F                                           |                       |           | 05             | 04                                  | 016                          | (FIRI)                              |
| R 0356 | M 3 OVC                           | 2                   | F                                           | 215                   | 42        | 00             | 04                                  | 017                          | FE25 / 10300 16// 40 20091          |
| 72791  | 30105                             | 12215               | 21506                                       | 316                   | 41        | 05             | 109                                 | 63207                        | 70020 20091 44940 0                 |
| S 0441 | M 3 OVC                           | 2                   | F                                           |                       |           | 00             | 00                                  | 015                          | (FIRI)                              |
| R 0456 | W 2 OVC                           | 2                   | F                                           | 220                   | 43        | 00             | 00                                  | 015                          |                                     |
| S 0541 | W 3 X                             | 1/2                 | F                                           |                       |           | 00             | 00                                  | 014                          | (FIRI)                              |
| R 0556 | W 3 X                             | 1/2                 | F                                           | 224                   | 43        | 00             | 00                                  | 019                          |                                     |
| S 0631 | W 2 X                             | 1/4                 | F                                           |                       |           | 00             | 00                                  | 019                          |                                     |
| R 0656 | W 2 X                             | 1/4                 | F                                           | 224                   | 42        | 00             | 00                                  | 019                          | 008                                 |
| R 0756 | W 2 X                             | 1/4                 | F                                           | 224                   | 43        | 00             | 00                                  | 019                          |                                     |
| R 0856 | W 2 X                             | 1/4                 | F                                           | 231                   | 43        | 10             | 03                                  | 021                          | USBY N 3/4                          |
| S 0926 | X M 3 OVC                         | 1                   | F                                           |                       |           | 00             | 00                                  | 022                          | F4 USBY SE-SW 1/2                   |
| S 0939 | X M 3 OVC                         | 1                   | F                                           |                       |           | 05             | 04                                  | 022                          | F4 USBY SE-SW 1/2 (FIRI)            |
| S 0955 | X M 4 OVC                         | 3/4                 | F                                           | 234                   | 44        | 01             | 05                                  | 022                          | F6 USBY E-S 1/4 / 310 16// 40       |
| 72791  | 30105                             | 12104               | 23407                                       | 342                   | 41        | 06             | 310                                 | 63225                        | 20091 44440 0                       |
| S 1015 | X M 7 OVC                         | 1/2                 | F                                           |                       |           | 00             | 00                                  | 024                          | F3 USBY SE-S 1/4                    |
| R 1055 | X M 7 OVC                         | 1/2                 | F                                           | 241                   | 45        | 00             | 00                                  | 024                          | F3 USBY SE-SW 1/2                   |
| S 1119 | X 4 SCT M 9 OVC                   | 1/2                 | F                                           |                       |           | 12             | 03                                  | 025                          | F2 USBY S-SW 1/4 20091 44440 0      |
| R 1155 | X 4 SCT M 9 OVC                   | 1/2                 | F                                           | 231                   | 45        | 06             | 04                                  | 021                          | F2 USBY S-SW 1/4 016 R 60           |
| S 1231 | X 4 SCT M 9 OVC                   | 1/2                 | R-F                                         |                       |           | 00             | 00                                  | 021                          | F2 USBY S-SW 1/4 N-N 53             |
| S 1244 | X 8 SCT M 9 OVC                   | 1                   | R-F                                         |                       |           | 00             | 00                                  | 019                          | F1 USBY SE-SW 1/4 (FIRI)            |
| R 1355 | X 8 SCT M 9 OVC                   | 1                   | R-F                                         | 217                   | 46        | 18             | 07                                  | 017                          | F1 USBY E-S 1/4 20091 44440 0       |
| 72791  | 30105                             | 12104               | 23407                                       | 342                   | 41        | 06             | 310                                 | 63225                        | 20091 44440 0                       |
| S 1310 | S 8 SCT M 9 OVC                   | 1                   | R-F                                         |                       |           | 14             | 06                                  | 016                          |                                     |
| R 1355 | S 8 SCT M 9 OVC                   | 1                   | R-F                                         | 200                   | 46        | 11             | 05                                  | 012                          | USBY S-SW 1/2                       |
| S 1444 | S 8 SCT M 9 OVC                   | 1                   | R-F                                         |                       |           | 01             | 06                                  | 013                          | USBY N-N 53 S-SW 1/2 (FIRI)         |
| R 1455 | S 8 SCT M 9 OVC                   | 1                   | R-F                                         | 200                   | 45        | 04             | 10                                  | 012                          | USBY N-N 54                         |
| S 1530 | S 8 SCT M 9 OVC                   | 1                   | R-F                                         |                       |           | 09             | 05                                  | 010                          |                                     |
| R 1555 | M 3 OVC                           | 5                   | R-F                                         | 193                   | 45        | 10             | 07                                  | 010                          | 72421 102/49                        |
| 72791  | 81007                             | 55616               | 19307                                       | 8062                  | 41        | 07             | 724                                 | 63185                        | 73140 20091 44440 0                 |
| R 1656 | E 2 OVC                           | 5                   | R-F                                         | 182                   | 46        | 06             | 06                                  | 007                          |                                     |
| S 1730 | E 2 OVC                           | 5                   | R-F                                         |                       |           | 03             | 07                                  | 007                          |                                     |
| R 1755 | E 2 OVC                           | 5                   | R-F                                         | 185                   | 46        | 05             | 10                                  | 008                          |                                     |
| S 1830 | E 2 OVC                           | 5                   | R-F                                         |                       |           | 07             | 10                                  | 005                          | (FIRI)                              |
| R 1857 | E 2 OVC                           | 5                   | R-F                                         | 175                   | 45        | 07             | 11                                  | 005                          | 81914 172 //                        |
| R 1927 | E 2 OVC                           | 5                   | L-F                                         | 171                   | 45        | 07             | 07                                  | 004                          | REL 10                              |
| S 1950 | E 2 OVC                           | 5                   | S-L-F                                       |                       |           | 06             | 06                                  | 003                          |                                     |
| R 2057 | E 2 OVC                           | 5                   | L-F                                         | 171                   | 46        | 07             | 06                                  | 004                          | NB 10 E 50                          |
| R 2156 | E 2 OVC                           | 5                   | L-F                                         | 175                   | 46        | 06             | 07                                  | 005                          | 50005 17// 49                       |
| 72791  | 81007                             | 55616               | 17508                                       | 872                   | 41        | 07             | 530                                 | 63166                        | 72573 20026 44940 0                 |
| R 2256 | E 2 OVC                           | 5                   | R-L-F                                       | 180                   | 46        | 07             | 05                                  | 006                          | NB 00                               |
| R 2356 | M 1 OVC                           | 5                   | R-L-F                                       | 173                   | 46        | 05             | 10                                  | 007                          |                                     |

WISO ASTORIA, ONE

## SURFACE WEATHER OBSERVATIONS

DATE DEC 3 1979

TO: [illegible] [illegible] [illegible]  
[illegible] [illegible] [illegible]

| TIME   | TIME  | SKY AND CEILING<br>(Number of Feet) | VISIBILITY<br>(Miles) |       | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP.<br>°F | DEW<br>POINT<br>°F | WIND<br>DIRECTION<br>SPEED<br>Knots | WAVE<br>DIRECTION<br>PERIOD<br>Knots | ALTER<br>SET<br>TING | REMARKS AND SUPPLEMENTAL CODED DATA |
|--------|-------|-------------------------------------|-----------------------|-------|---------------------------------------------|------------------------|-------------|--------------------|-------------------------------------|--------------------------------------|----------------------|-------------------------------------|
|        |       |                                     | SURFACE               | TOWER |                                             |                        |             |                    |                                     |                                      |                      |                                     |
| R 010  | F 030 | Bw 45                               | 20                    |       |                                             | 83.4                   | 42.1        | 13.0               | 04                                  | 025                                  | 803                  | 15//                                |
| R 010  | F 030 | Bw 45                               | 10                    |       |                                             | 83.4                   | 44.4        | 11.0               | 03                                  | 031                                  |                      |                                     |
| /      |       | 200                                 |                       |       |                                             |                        |             |                    |                                     |                                      |                      |                                     |
| R 010  | F 030 | Bw 45                               | 10                    |       |                                             | 83.1                   | 44.1        | 13.1               | 05                                  | 031                                  |                      |                                     |
| /      |       | 200                                 |                       |       |                                             |                        |             |                    |                                     |                                      |                      |                                     |
| R 010  | F 030 | M. 20                               | 10                    |       |                                             | 83.1                   | 42.1        | 13.1               | 05                                  | 031                                  | 603                  | 15// 43                             |
| /      |       | 200                                 |                       |       |                                             |                        |             |                    |                                     |                                      |                      |                                     |
| /      | 7791  | 21005                               | 62032                 | 23109 | 854//                                       | 07609                  | 63232       | 45143              | (1)                                 |                                      |                      |                                     |
| R 010  | M 140 | Bw 30                               | 10                    |       |                                             | 83.4                   | 42.1        | 13.1               | 10                                  | 010                                  |                      |                                     |
| R 010  | M 140 | Bw 30                               | 10                    |       |                                             | 81.5                   | 49.1        | 13.1               | 10                                  | 021                                  |                      |                                     |
| R 010  | F 170 | Bw 30                               | 10                    |       |                                             | 81.0                   | 49.1        | 17.0               | 03                                  | 015                                  | 720                  | 15//                                |
| R 010  | F 170 | Bw 30                               | 10                    |       |                                             | 80.7                   | 49.1        | 17.1               | 13                                  | 020                                  | 121A                 | SW-120                              |
| S 0857 | E 140 | 200                                 | 101                   |       |                                             | 201                    | 49.44       | 19.1               | 16                                  | 6231013                              |                      |                                     |
| S 1001 | E 140 | 200                                 | 172                   |       | R-F                                         | 19.1                   | 12          | 6231110            |                                     |                                      |                      |                                     |
| S 1001 | E 140 | 200                                 | 2                     |       | R-F                                         | 210                    | 48.45       | 18.1               | 14                                  | 6211010                              | 00002                | 17// 43                             |
| /      | 7771  | 21214                               | 20612                 | 21009 | 873//                                       | 07010                  | 63232       | 70210              | 20002                               | 44943                                | (1)                  |                                     |
| S 1002 | E 140 | 200                                 | 4                     |       | R-F                                         | 19.1                   | 15          | 6211014            |                                     |                                      |                      |                                     |
| S 1002 | E 140 | 200                                 | 5                     |       | R-F                                         | 207                    | 49.47       | 19.1               | 16                                  | 6271010                              | 0K WND 1927/54       |                                     |
| S 1002 | E 140 | 200                                 | 5                     |       | R-F                                         | 200                    | 49.47       | 19.1               | 18                                  | 6271012                              | FK WND 1930/40       |                                     |
| S 1002 | E 140 | 200                                 | 5                     |       | R-F                                         | 193                    | 49.46       | 19.1               | 20                                  | 6291012                              | PK WND 1929/58       | 51203 17//                          |
| S 1002 | E 140 | 200                                 | 5                     |       | R-F                                         | 192                    | 49.47       | 20.1               | 18                                  | 6291010                              | PK WND 1932/53       |                                     |
| S 1002 | E 140 | 200                                 | 2                     |       | R-F                                         | 201                    | 15          | 6211012            |                                     |                                      |                      | (5101)                              |
| S 1002 | E 140 | 200                                 | 2                     |       | R-F                                         | 197                    | 49.47       | 19.1               | 17                                  | 6221011                              | PK WND 1932/45       |                                     |
| S 1002 | E 140 | 200                                 | 4                     |       | R-F                                         | 201                    | 15          | 6281012            |                                     |                                      |                      |                                     |
| S 1002 | E 140 | 200                                 | 2                     |       | R-F                                         | 200                    | 49.47       | 20.1               | 15                                  | 6221012                              | 1931 17// 43         |                                     |
| /      | 7771  | 21210                               | 20616                 | 20009 | 873//                                       | 07010                  | 63180       | 71120              | 20012                               | 44943                                | (1)                  |                                     |
| R 1002 | M 140 | Bw 30                               | 2                     |       | R-E                                         | 201                    | 49.43       | 21.1               | 10                                  | 010                                  |                      |                                     |
| R 1002 | M 140 | Bw 30                               | 2                     |       | R-E                                         | 205                    | 49.43       | 21.1               | 13                                  | 019                                  | 011                  |                                     |
| S 1002 | M 140 | 200                                 | 2                     |       | R-E                                         | 224                    | 10          |                    |                                     | 05                                   |                      |                                     |
| R 1002 | M 140 | 200                                 | 2                     |       | R-E                                         | 210                    | 50.44       | 22.0               | 07                                  | 05                                   | 21010                | 17//                                |
| S 1002 | M 140 | 200                                 | 5                     |       | E                                           | 214                    | 49.43       | 22.0               | 06                                  |                                      | 016                  | 0976                                |
| S 1002 | M 140 | 200                                 | 7                     |       |                                             | 220                    | 49.43       | 22.0               | 07                                  |                                      | 018                  |                                     |
| S 1002 | M 140 | 200                                 | 7                     |       |                                             | 220                    | 49.43       | 22.0               | 07                                  |                                      | 018                  |                                     |
| S 1002 | M 140 | 200                                 | 5                     |       | E                                           | 214                    | 49.43       | 22.0               | 05                                  |                                      | 016                  | 0976                                |
| /      | 7771  | 21210                               | 20616                 | 20009 | 873//                                       | 07010                  | 63232       | 71120              | 20012                               | 44943                                | (1)                  |                                     |
| R 1002 | M 140 | Bw 30                               | 5                     |       | R-E                                         | 224                    | 49.43       | 22.0               | 03                                  | 09                                   | 224                  |                                     |
| R 1002 | M 140 | Bw 30                               | 5                     |       | R-E                                         | 192                    | 49.43       | 21.0               | 05                                  | 019                                  |                      |                                     |

|                                                                                                   |  |                  |
|---------------------------------------------------------------------------------------------------|--|------------------|
| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL BUREAU OF METEOROLOGY<br>OFFICE OF MARINE WEATHER SERVICE |  | WSO ASTORIA, ORE |
| SURFACE WEATHER OBSERVATIONS                                                                      |  | DEC 4 1972       |

| TIME | STATION | WEATHER<br>AND<br>CLOUDS | SEA<br>STATE | WIND<br>DIRECTION<br>AND<br>SPEED | WIND<br>GUST | TEMPERATURE<br>AIR | TEMPERATURE<br>SEA | TEMPERATURE<br>SURFACE | TEMPERATURE<br>DEW POINT | TEMPERATURE<br>WIND CHILL | REMARKS AND SUPPLEMENTAL CODED DATA |
|------|---------|--------------------------|--------------|-----------------------------------|--------------|--------------------|--------------------|------------------------|--------------------------|---------------------------|-------------------------------------|
| 0054 | 4520    | R-F                      |              | 210 40                            | 20 04        | 015                | 20 09              | 17 11                  |                          |                           |                                     |
| 0154 | 4520    | R-F                      |              | 204 40                            | 20 04        | 012                |                    |                        |                          |                           |                                     |
| 0254 | 4520    | R-F                      |              |                                   | 20 00        | 014                |                    |                        |                          |                           | (F101)                              |
| 0354 | 4520    | R-F                      |              | 210 40                            | 20 00        | 015                |                    |                        |                          |                           |                                     |
| 0454 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                | 017 12             | 17 11                  | 44                       | 20035                     |                                     |
| 0554 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0654 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0754 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0854 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0954 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1054 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1154 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1254 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1354 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1454 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1554 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1654 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1754 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1854 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1954 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2054 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2154 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2254 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2354 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0054 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0154 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0254 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0354 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0454 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0554 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0654 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0754 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0854 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 0954 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1054 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1154 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1254 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1354 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1454 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1554 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1654 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1754 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1854 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 1954 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2054 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2154 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2254 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |
| 2354 | 4520    | R-F                      |              | 192 40                            | 20 04        | 010                |                    |                        |                          |                           |                                     |

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                          | WSO ASTORIA, ORE             |                                     |
|------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------|-------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |                          | DATE<br>DEC 15 1966          | NO. CORRECTIONS TO DATA<br>ADD 3    |
| TIME                                                                                                       | WIND AND CEILING         | WEATHER<br>AND<br>VISIBILITY | REMARKS AND SUPPLEMENTAL CODED DATA |
| 0000                                                                                                       | 20 KTS E 45 BKN 10       | 295 40 35 29 09              | 040 312 1300                        |
| 0100                                                                                                       | 20 KTS 45 SCT 10         | 295 37 33 22 04              | 041                                 |
| 0200                                                                                                       | 20 KTS 45 SCT 10         | 302 34 31 13 04              | 042                                 |
| 0300                                                                                                       | 20 KTS 45 SCT 10         | 302 32 30 12 04              | 042 107 1300 32 20024               |
| 0400                                                                                                       | 20 KTS 2120N 10021 32200 | 295 30 31 07 03              | 20024 45132 0                       |
| 0500                                                                                                       | 20 KTS 10                | 305 32 29 13 04              | 043                                 |
| 0600                                                                                                       | 20 KTS 10                | 305 32 30 12 04              | 043                                 |
| 0700                                                                                                       | 20 KTS E 34 BKN 10       | 312 35 31 11 04              | 045 110 1300                        |
| 0800                                                                                                       | 20 KTS E 30 BKN 10       | 315 34 31 11 06              | 046 200 N-NW                        |
| 0900                                                                                                       | 20 KTS 10                | 319 34 32 12 04              | 047                                 |
| 1000                                                                                                       | 20 KTS 10                | 322 35 33 13 04              | 047 200 S-WT SW-NW/810 1100         |
| 1100                                                                                                       | 20 KTS 2120N 10021 32200 | 315 30 31 10 03              | 632 3 20006 442300                  |
| 1200                                                                                                       | 20 KTS 10                | 322 31 32 06 05              | 048                                 |
| 1300                                                                                                       | 20 KTS 25 SCT 10         | 315 43 39 16 05              | 049                                 |
| 1400                                                                                                       | 20 KTS 1035 BKN 10       | 322 34 33 16 05              | 049 317 1100                        |
| 1500                                                                                                       | 20 KTS 25 SCT 10         | 320 47 37 14 05              | 049                                 |
| 1600                                                                                                       | 20 KTS 25 SCT 10         | 322 45 36 17 07              | 050                                 |
| 1700                                                                                                       | 20 KTS 25 SCT 10         | 322 44 35 17 07              | 050 217 1100 47 4 20005             |
| 1800                                                                                                       | 20 KTS 2120N 10021 32200 | 315 30 31 10 03              | 632 3 20006 442300                  |
| 1900                                                                                                       | 20 KTS E 45 BKN 10       | 323 44 34 17 07              | 051 200 N-NW 40005 0-SW             |
| 2000                                                                                                       | 20 KTS E 45 BKN 10       | 321 41 33 17 06              | 052                                 |
| 2100                                                                                                       | 20 KTS E 45 BKN 10       | 325 41 33 15 07              | 053 014 1300                        |
| 2200                                                                                                       | 20 KTS E 45 BKN 10       | 324 38 34 09 04              | 051 004 445 SCT 0 300               |
| 2300                                                                                                       | 20 KTS 10                | 323 35 33 15 04              | 051                                 |
| 2400                                                                                                       | 20 KTS 10                | 324 32 30 16 05              | 051 200 1513 47                     |
| 0100                                                                                                       | 20 KTS 2120N 10021 32200 | 315 30 31 10 03              | 632 3 20006 442300                  |
| 0200                                                                                                       | 20 KTS 10                | 324 32 30 16 05              | 052                                 |
| 0300                                                                                                       | 20 KTS 10                | 324 32 31 16 05              | 053                                 |

| STATION          |       | DATE           |            | TIME                               |           | SURFACE WEATHER OBSERVATIONS |            | REMARKS AND SUPPLEMENTAL CODED DATA |                                       |
|------------------|-------|----------------|------------|------------------------------------|-----------|------------------------------|------------|-------------------------------------|---------------------------------------|
| WFO ASTORIA, ORE |       | DEC 17 1978    |            | 1500                               |           | 1500                         |            | 1500                                |                                       |
| TIME             | WE    | SKY AND CLOUDS | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA       | TEMP                         | WIND       | WAVE                                | REMARKS                               |
| TIME             | WE    | SKY AND CLOUDS | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA       | TEMP                         | WIND       | WAVE                                | REMARKS                               |
| R 1500           | 1500  | FEW BKN 4000   | 5          | R-                                 | 022 45 37 | 17                           | 15 021 000 | PK WND                              | 1700/09 / 13501 1511                  |
| R 1500           | 1500  | FEW BKN 4000   | 4          | RW                                 | 997 41 36 | 17                           | 23 643 000 | FEW BKN                             | PK WND 1900/51                        |
| R 1500           | 1500  | FEW BKN 4000   | 8          | RW-                                | 991 41 38 | 20                           | 22 634 951 | FEW WND                             | 1039/07                               |
| R 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 201 41 38 | 20                           | 15 622 953 | FEW WND                             | 1931/11 / 3191 1540 24 20             |
| / /              | 12791 | 62015 61256    | 00007      |                                    | 63500     | 03319                        | 69992      | 71530                               | 20225 444716 0                        |
| R 1500           | 1500  | FEW BKN 4000   | 10         | RW-                                | 009 43 37 | 21                           | 19 625 956 | FEW WND                             | 2027/41 2707                          |
| R 1500           | 1500  | FEW BKN 4000   | 8          | RW-                                | 016 40 36 | 23                           | 12         | 253                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 7          | RW                                 | 021 40 36 | 25                           | 08         | 9601 22420                          | 1211                                  |
| R 1500           | 1500  | FEW BKN 4000   | 5          | RW                                 | 032 38 34 | 16                           | 04         | 963 00 0000 RW-                     |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 5          | RW-F                               | 041 37 35 | 09                           | 04         | 965                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 5          | RW-F                               | 049 38 36 | 10                           | 03         | 967 03453                           | 1511 36                               |
| ---              | 72791 | 91003          | 55908      |                                    | 04803     | 85411                        | 02204      | 63039                               | 175340 20091 44536 0                  |
| S 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 048 39 37 | 09                           | 07         | 967 1247                            | FEW STERX PHUD MID-SE 4000            |
| S 1500           | 1500  | FEW BKN 4000   | 10         |                                    |           | 09                           | 08         | 966                                 | FEW STERX PHUD MID-SE 4000            |
| R 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 046 41 38 | 07                           | 06         | 967                                 | FEW STERX PHUD MID-SE 4000            |
| R 1500           | 1500  | FEW BKN 4000   | 15         |                                    | 048 42 39 | 04                           | 06         | 967                                 | FEW STERX PHUD MID-SE 4000            |
| S 1500           | 1500  | FEW BKN 4000   | 15         |                                    | 051 40 37 | 03                           | 06         | 968                                 | RW 0500 SW-W                          |
| S 1500           | 1500  | FEW BKN 4000   | 5          | TW-                                |           | 37                           | 15618      | 970 12307                           | 0534 0002 SW-W                        |
| S 1500           | 1500  | FEW BKN 4000   | 1          | SW-F                               |           | 29                           | 110        | 970 12307                           | 0534 0002 SW-W                        |
| S 1500           | 1500  | FEW BKN 4000   | 5          | RW-F                               |           | 33                           | 04         | 970                                 | CIG 260 (3101)                        |
| S 1500           | 1500  | FEW BKN 4000   | 7          | RW-                                | 058 35 32 | 14                           | 03         | 970                                 | CIG 260 1200 1205 1205 1205 1205      |
| S 1500           | 1500  | FEW BKN 4000   | 7          | RW-                                |           | 13                           | 09         | 970                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 7          | RW-                                | 058 35 33 | 13                           | 12         | 970                                 | 11020 1711 44                         |
| ---              | 72741 | 81312          | 51909      |                                    | 05302     | 57411                        | 01110      | 63049                               | 72029 20052 44435 0000 0000 0000 0000 |
| R 1500           | 1500  | FEW BKN 4000   | 7          | RW-                                | 068 36 33 | 20                           | 03         | 970                                 |                                       |
| S 1500           | 1500  | FEW BKN 4000   | 1          |                                    | 070 35 33 | 11                           | 06         | 970                                 | 1247                                  |
| S 1500           | 1500  | FEW BKN 4000   | 2          |                                    | 073 35 33 | 07                           | 06         | 970                                 | 000000 11511 1511                     |
| S 1500           | 1500  | FEW BKN 4000   | 1          |                                    |           | 16                           | 04         | 970                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 072 34 32 | 00                           | 00         | 970                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 072 34 32 | 12                           | 04         | 970                                 |                                       |
| R 1500           | 1500  | FEW BKN 4000   | 10         |                                    | 087 32 30 | 00                           | 00         | 970                                 | 21416 1038 45                         |
| / /              | 72791 | 62015 61256    | 00007      |                                    | 63500     | 03319                        | 69992      | 71530                               | 20225 444716 0                        |
| S 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW (3101)                            |
| S 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW                                   |
| S 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW                                   |
| S 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW                                   |
| S 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW                                   |
| R 2245           | -X    |                | 10         | F                                  |           | 00                           | 00         | 970                                 | FEW                                   |

101-12A

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

AND ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE DEC 20 1973 TO CONVERT LIST TO GMT ADD 8 HRS. SUBTRACT

| TIME | SKY AND CLOUDS | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA LEVEL PRESSURE | TEMP | DEN | WIND | WIND SPEED | WIND DIRECTION | REMARKS AND SUPPLEMENTAL CODED DATA |
|------|----------------|------------|------------------------------------|--------------------|------|-----|------|------------|----------------|-------------------------------------|
| 0056 | 45 SCT         | 10         |                                    | 24825              | 10   | 06  | 08   | 026        | 107            | 1500                                |
| 0155 | M45 BKN        | 10         |                                    | 25125              | 10   | 12  | 05   | 027        |                |                                     |
| 0255 | M45 BKN        | 10         |                                    | 25625              | 9    | 09  | 07   | 029        |                |                                     |
| 0355 | 40 SCT         | 10         |                                    | 25823              | 9    | 06  | 06   | 029        | 110            | 1500 22                             |
| 0456 | 40 SCT         | 10         |                                    | 25824              | 10   | 06  | 10   | 029        |                |                                     |
| 0555 | CLR            | 10         |                                    | 26124              | 11   | 06  | 12   | 030        |                |                                     |
| 0657 | CLR            | 15         |                                    | 26622              | 10   | 07  | 10   | 032        | 308            |                                     |
| 0757 | 40 SCT         | 20         |                                    | 27021              | 10   | 07  | 07   | 033        |                |                                     |
| 0856 | 40 SCT         | 20         |                                    | 27524              | 10   | 08  | 09   | 035        |                |                                     |
| 0956 | CLR            | 20         |                                    | 28325              | 10   | 05  | 10   | 037        | 117            | 1500 20                             |
| 1056 | CLR            | 20         |                                    | 29026              | 11   | 03  | 06   | 039        |                |                                     |
| 1156 | CLR            | 20         |                                    | 29527              | 11   | 04  | 01   | 039        |                |                                     |
| 1256 | CLR            | 20         |                                    | 29528              | 11   | 03  | 08   | 037        | 202            | 1500                                |
| 1356 | CLR            | 20         |                                    | 29329              | 10   | 05  | 09   | 037        |                |                                     |
| 1456 | CLR            | 20         |                                    | 29327              | 9    | 04  | 11   | 037        |                |                                     |
| 1556 | CLR            | 20         |                                    | 29328              | 9    | 05  | 08   | 037        | 602            | 1500 30                             |
| 1656 | CLR            | 15         |                                    | 28727              | 09   | 06  | 08   | 032        |                |                                     |
| 1755 | CLR            | 15         |                                    | 28825              | 09   | 09  | 06   | 033        |                |                                     |
| 1857 | CLR            | 15         |                                    | 29225              | 11   | 07  | 08   | 039        | 208            |                                     |
| 1955 | CLR            | 15         |                                    | 29322              | 10   | 08  | 06   | 040        |                |                                     |
| 2055 | CLR            | 15         |                                    | 29922              | 11   | 07  | 08   | 041        |                |                                     |
| 2156 | F100 BCL       | 15         |                                    | 29922              | 11   | 11  | 07   | 041        | 107            | 107/ 20                             |
| 2255 | F100 BKN       | 15         |                                    | 29921              | 11   | 12  | 04   | 041        |                |                                     |
| 2357 | F100 BKN       | 15         |                                    | 30223              | 11   | 00  | 20   | 042        |                |                                     |

| U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |      |                                                |                     |                                             |                        |                               |                              |                                         |                                | STATION<br>WCO ASTORIA, ORE         |                                             |
|------------------------------------------------------------------------------------------------------------|------|------------------------------------------------|---------------------|---------------------------------------------|------------------------|-------------------------------|------------------------------|-----------------------------------------|--------------------------------|-------------------------------------|---------------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                                               |      |                                                |                     |                                             |                        |                               |                              |                                         |                                | DATE<br>DEC 01 1973                 | TO CONVERT EST TO GWT<br>100 R 1/2 SUBTRACT |
| TIME                                                                                                       | TIME | SKY AND CEILING<br>HEIGHT IN FEET              | VISIBILITY<br>MILES | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP<br>DEW                   | WIND<br>DIR<br>SPEED<br>GUST | WIND<br>CHANGING<br>IN<br>LAST<br>3 HRS | ALTIMETER<br>READING<br>INCHES | REMARKS AND SUPPLEMENTAL CODED DATA |                                             |
| R                                                                                                          | 0057 | E 55 OVC                                       | 10                  |                                             | 302.23                 | 10 08 06                      | 042                          |                                         | 103 15 //                      |                                     |                                             |
| R                                                                                                          | 0156 | E 55 OVC                                       | 10                  |                                             | 303.23                 | 8 08 04                       | 043                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 0257 | E 55 OVC 100 OVC                               | 10                  |                                             | 302.24                 | 9 07 06                       | 042                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 0356 | 55 SCT 100 SCT                                 | 10                  |                                             | 300.22                 | 8 08 06                       | 042                          |                                         | 802 1570 21                    |                                     |                                             |
| /                                                                                                          | /    | 72791 4806 14012 30056 25770 63802 63271 45021 |                     |                                             |                        |                               |                              |                                         |                                |                                     |                                             |
| R                                                                                                          | 0456 | 4806 E 55 OVC                                  | 10                  |                                             | 298.24                 | 10 08 07                      | 041                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 0556 | 4806 E 65 OVC                                  | 10                  |                                             | 295.22                 | 10 07 08                      | 040                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 0656 | M 3 OVC 15 OVC                                 | 10                  |                                             | 298.23                 | 11 07 08                      | 041                          |                                         | 502 15 //                      |                                     |                                             |
| R                                                                                                          | 0756 | E 35 OVC                                       | 20                  |                                             | 298.24                 | 12 07 07                      | 041                          |                                         |                                |                                     |                                             |
| S                                                                                                          | 0800 | M 25 OVC                                       | 20                  |                                             |                        | 07 09                         | 041                          |                                         |                                | (Fog)                               |                                             |
| R                                                                                                          | 0856 | M 25 OVC                                       | 20                  |                                             | 200.24                 | 10 07 09                      | 041                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 0956 | E 25 OVC                                       | 20                  |                                             | 202.24                 | 11 08 10                      | 042                          |                                         | 5000 MUR E / 100 15 //         | 21                                  |                                             |
| /                                                                                                          | /    | 72791 50910 501512 3220                        |                     |                                             | 555 //                 | 62400 63293 42521             |                              |                                         |                                |                                     |                                             |
| R                                                                                                          | 1056 | E 25 OVC                                       | 15                  |                                             | 302.25                 | 11 07 11                      | 042                          |                                         | WU BSHT E                      |                                     |                                             |
| R                                                                                                          | 1156 | M 25 OVC                                       | 10                  | S-                                          | 298.25                 | 12 07 14                      | 041                          |                                         | 5346                           |                                     |                                             |
| R                                                                                                          | 1256 | M 25 OVC                                       | 7                   | S-                                          | 292.25                 | 15 07 12                      | 039                          |                                         | 51000 15 //                    |                                     |                                             |
| R                                                                                                          | 1356 | M 25 OVC                                       | 4                   | S-                                          | 285.25                 | 17 07 13                      | 037                          |                                         |                                |                                     |                                             |
| S                                                                                                          | 1456 | W 2 X                                          | 2                   | S-                                          |                        | 06 11                         | 036                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 1556 | W 2 X                                          | 1                   | S-                                          | 281.24                 | 10 07 11                      | 036                          |                                         |                                |                                     |                                             |
| S                                                                                                          | 1656 | -X M 22 OVC                                    | 2                   | S-                                          |                        | 07 12                         | 036.52                       |                                         |                                |                                     |                                             |
| R                                                                                                          | 1756 | -X E 22 OVC                                    | 2                   | S-                                          | 281.24                 | 17 07 11                      | 036.59                       |                                         | 5503 15 //                     | 26                                  |                                             |
| /                                                                                                          | /    | 72791 50911 32217 29154 555 //                 |                     |                                             |                        | 5700 63273 70359 20003 42421  |                              |                                         |                                |                                     |                                             |
| R                                                                                                          | 1856 | W 10 X                                         | 1                   | S-                                          | 275.23                 | 19 09 00                      | 035                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 1956 | -X M 22 OVC                                    | 2                   | S-                                          | 271.23                 | 20 09 09                      | 035.59                       |                                         |                                |                                     |                                             |
| R                                                                                                          | 2056 | -X M 22 OVC                                    | 2                   | S-                                          | 270.23                 | 19 09 11                      | 035                          |                                         | 61209 15 //                    | *593                                |                                             |
| R                                                                                                          | 2156 | -X M 22 OVC                                    | 2                   | S-                                          | 270.24                 | 19 06 12                      | 035                          |                                         | 33                             |                                     |                                             |
| S                                                                                                          | 2224 | M 2 OVC                                        | 7                   |                                             |                        | 06 10                         | 035.56 22                    |                                         |                                |                                     |                                             |
| R                                                                                                          | 2357 | M 2 OVC                                        | 7                   |                                             | 280.24                 | 17 06 15                      | 035.56 22                    |                                         |                                |                                     |                                             |
| R                                                                                                          | 2456 | M 2 OVC                                        | 7                   |                                             | 281.25                 | 15 06 15                      | 036.11209 15 //              |                                         | 26                             |                                     |                                             |
| /                                                                                                          | /    | 72791 50915 61027 28154 555 //                 |                     |                                             |                        | 50112 63273 70322 20012 42421 |                              |                                         |                                |                                     |                                             |
| R                                                                                                          | 2556 | 35 SCT                                         | 7                   |                                             | 287.24                 | 13 06 13                      | 035                          |                                         |                                |                                     |                                             |
| R                                                                                                          | 2657 | 35 SCT                                         | 7                   |                                             | 288.24                 | 16 06 16                      | 035                          |                                         |                                |                                     |                                             |

| NATIONAL OCEANOGRAPHIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |      | JULY DEPARTMENT OF COMMERCE<br>NATIONAL WEATHER SERVICE |            | STATION<br>WSO ASTORIA, ORE |                                          | DATE<br>JAN 10 1979    |       | TO CONVERT LIST TO<br>ADD 15 MIN. SURF. 17 |                            |               |               |              |               |               |               |              |               |               |               |                                     |
|-----------------------------------------------------------------------------------|------|---------------------------------------------------------|------------|-----------------------------|------------------------------------------|------------------------|-------|--------------------------------------------|----------------------------|---------------|---------------|--------------|---------------|---------------|---------------|--------------|---------------|---------------|---------------|-------------------------------------|
| SURFACE WEATHER OBSERVATIONS                                                      |      |                                                         |            |                             |                                          |                        |       |                                            |                            |               |               |              |               |               |               |              |               |               |               |                                     |
| TIME                                                                              | TYPE | SEA AND CEILING                                         | VISIBILITY |                             | WEATHER AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP. | DEW<br>PT.                                 | WIND<br>DIRECTION<br>SPEED | WIND<br>GUSTS | WIND<br>SHEAR | WIND<br>WAVE | WIND<br>SWELL | WIND<br>HEAVY | WIND<br>LIGHT | WIND<br>WAVE | WIND<br>SWELL | WIND<br>HEAVY | WIND<br>LIGHT | REMARKS AND SUPPLEMENTAL CODED DATA |
|                                                                                   |      |                                                         | SMALL      | WIND                        |                                          |                        |       |                                            |                            |               |               |              |               |               |               |              |               |               |               |                                     |
| 0057                                                                              | SA   | E 25 OVC                                                | 10         |                             |                                          | 176.36                 | 33    | 03                                         | 06                         |               |               |              |               |               |               |              |               |               |               | 214 15//                            |
| 0158                                                                              | SA   | 18 SGT E 25 OVC                                         | 10         |                             | NW-                                      | 185.37                 | 33    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 208 1840                            |
| 0258                                                                              | SA   | 12 SGT E 20 OVC                                         | 10         |                             |                                          | 190.36                 | 33    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 209 1830                            |
| 0356                                                                              | SA   | 12 SGT E 20 OVC                                         | 10         |                             |                                          | 190.37                 | 34    | 13                                         | 03                         |               |               |              |               |               |               |              |               |               |               | 209 11400 18// 34                   |
| 0456                                                                              | SA   | 12 SGT E 20 OVC                                         | 10         |                             | 19003 884//                              | 01114                  | 63181 | 70050                                      | 44434                      |               |               |              |               |               |               |              |               |               |               | 0                                   |
| 0556                                                                              | SA   | 14 SGT E 20 OVC                                         | 10         |                             |                                          | 193.36                 | 34    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 010                                 |
| 0656                                                                              | SA   | 14 SGT E 20 OVC                                         | 8          |                             |                                          | 200.37                 | 34    | 02                                         | 04                         |               |               |              |               |               |               |              |               |               |               | 012                                 |
| 0757                                                                              | SA   | 14 SGT E 20 OVC                                         | 8          |                             |                                          | 205.37                 | 34    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 214 215 18//                        |
| 0858                                                                              | SA   | E 18 OVC                                                | 5          |                             | F                                        | 207.38                 | 35    | 05                                         | 03                         |               |               |              |               |               |               |              |               |               |               | 014                                 |
| 0958                                                                              | SA   | M 18 OVC                                                | 5          |                             | F                                        | 210.37                 | 35    | 05                                         | 03                         |               |               |              |               |               |               |              |               |               |               | 015                                 |
| 1058                                                                              | SA   | M 18 OVC                                                | 5          |                             | F                                        | 217.39                 | 36    | 03                                         | 05                         |               |               |              |               |               |               |              |               |               |               | 017 212 15// 33                     |
| 1158                                                                              | SA   | M 18 OVC                                                | 6          |                             | F                                        | 217.41                 | 37    | 05                                         | 03                         |               |               |              |               |               |               |              |               |               |               | 017 212 15// 33                     |
| 1258                                                                              | SA   | M 18 OVC                                                | 6          |                             | F                                        | 217.41                 | 36    | 06                                         | 03                         |               |               |              |               |               |               |              |               |               |               | 017 000 15//                        |
| 1358                                                                              | SA   | M 18 OVC                                                | 7          |                             |                                          | 215.42                 | 37    | 07                                         | 07                         |               |               |              |               |               |               |              |               |               |               | 017                                 |
| 1458                                                                              | SA   | M 18 OVC                                                | 7          |                             |                                          |                        |       | 09                                         | 05                         |               |               |              |               |               |               |              |               |               |               | 015                                 |
| 1558                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 214.44                 | 38    | 09                                         | 04                         |               |               |              |               |               |               |              |               |               |               | 016 811000                          |
| 1658                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.42                 | 37    | 09                                         | 06                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1758                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1858                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1958                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2058                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2158                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2258                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2358                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0059                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0159                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0259                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0359                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0459                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0559                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0659                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0759                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0859                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 0959                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1059                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1159                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1259                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1359                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1459                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1559                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1659                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1759                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1859                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 1959                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2059                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2159                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2259                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |
| 2359                                                                              | SA   | M 30 OVC                                                | 10         |                             |                                          | 210.39                 | 35    | 00                                         | 00                         |               |               |              |               |               |               |              |               |               |               | 015 707 1570 44                     |



| NO. 132A                     |      | U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                     |           |                                          |                                  |                     |                   |        |       |        | STATION<br>WSO ASTORIA, ORE   |                                     | DATE<br>JAN 19 1979 |    | TO CONVERT LIST TO GMT<br>ADD -8 -M. SUBTRACT |        |
|------------------------------|------|------------------------------------------------------------------------------------------------------------|---------------------|-----------|------------------------------------------|----------------------------------|---------------------|-------------------|--------|-------|--------|-------------------------------|-------------------------------------|---------------------|----|-----------------------------------------------|--------|
| SURFACE WEATHER OBSERVATIONS |      |                                                                                                            |                     |           |                                          |                                  |                     |                   |        |       |        |                               |                                     |                     |    |                                               |        |
| TIME                         | TYPE | SKY AND CEILING<br>HEIGHT IN FEET                                                                          | VISIBILITY<br>Miles |           | WEATHER AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS.<br>INCHES | TEMP.<br>AIR<br>FAH | DEW<br>PT.<br>FAH | WIND   |       |        | ALTITUDE<br>SETTING<br>INCHES | REMARKS AND SUPPLEMENTAL CODED DATA |                     |    |                                               |        |
|                              |      |                                                                                                            | SURFACE             | TO HORIZ. |                                          |                                  |                     |                   | DIR.   | SPEED | CHANG. |                               |                                     |                     |    |                                               |        |
| SA 1058                      |      | M 11 OVC                                                                                                   | 3                   |           | R-F                                      | 222                              | 37.35               | 06                | 06     |       |        | 019                           | 80508                               | 102                 | /  |                                               |        |
| SP 0121                      |      | 1 SCT M 9 OVC                                                                                              | 3                   |           | R-F                                      |                                  |                     |                   | 05     | 05    |        | 019                           |                                     |                     |    |                                               |        |
| RS 0157                      |      | 2 SCT M 8 OVC                                                                                              | 4                   |           | R-F                                      | 224                              | 37.35               | 12                | 03     |       |        | 019                           |                                     |                     |    |                                               |        |
| SP 0245                      |      | 2 SCT M 7 OVC                                                                                              | 4                   |           | L-F                                      |                                  |                     |                   | 06     | 03    |        | 019                           |                                     |                     |    |                                               | (FIRI) |
| SA 0250                      |      | 2 SCT M 7 OVC                                                                                              | 4                   |           | R-F                                      | 224                              | 37.35               | 01                | 03     |       |        | 019                           | REL 340 LER 052                     |                     |    |                                               |        |
| RS 0356                      |      | 2 SCT M 6 OVC                                                                                              | 4                   |           | R-F                                      | 220                              | 37.35               | 05                | 04     |       |        | 018                           | 80210                               | 172                 | /  | 37                                            | 20010  |
| / /                          |      | 72791 80504                                                                                                | 56616               |           | 22003                                    | 2712                             | 02802               | 65212             | 71060  | 20010 | 44437  | 0                             |                                     |                     |    |                                               |        |
| RS 0456                      |      | 2 SCT M 4 OVC                                                                                              | 3                   |           | R-F                                      | 220                              | 37.35               | 09                | 05     |       |        | 018                           |                                     |                     |    |                                               |        |
| SP 0518                      |      | M 2 BKN 4 OVC                                                                                              | 2                   |           | R-F                                      |                                  |                     |                   | 05     | 07    |        | 013                           |                                     |                     |    |                                               |        |
| SA 0558                      |      | M 2 BKN 4 OVC                                                                                              | 2                   |           | R-F                                      | 224                              | 38.35               | 09                | 03     |       |        | 019                           |                                     |                     |    |                                               |        |
| SP 0644                      |      | M 2 BKN 4 OVC                                                                                              | 1 1/2               |           | R-F                                      |                                  |                     |                   | 08     | 08    |        | 019                           |                                     |                     |    |                                               | (FIRI) |
| RS 0657                      |      | 2 SCT M 4 OVC                                                                                              | 1 1/2               |           | R-F                                      | 227                              | 38.36               | 07                | 09     |       |        | 020                           | 30704                               | 172                 | /  |                                               |        |
| SA 0707                      |      | 2 SCT E 4 OVC                                                                                              | 1 1/2               |           | R-F                                      | 234                              | 37.35               | 05                | 04     |       |        | 022                           |                                     |                     |    |                                               |        |
| RS 0855                      |      | M 2 OVC                                                                                                    | 1                   |           | L-F                                      | 241                              | 38.36               | 05                | 03     |       |        | 024                           | REL 315                             |                     |    |                                               |        |
| SP 0929                      |      | M 2 OVC                                                                                                    | 1 1/2               |           | L-F                                      | 244                              |                     |                   | 09     | 04    |        | 025                           |                                     |                     |    |                                               |        |
| RS 0954                      |      | M 2 OVC                                                                                                    | 2                   |           | L-F                                      | 248                              | 38.37               | 07                | 04     |       |        | 026                           | 22005                               | 17                  | // | 32                                            |        |
| / /                          |      | 72791 80704                                                                                                | 32516               |           | 24303                                    | 2711                             | //                  | 03220             | 631239 | 70570 | 20015  | 43332                         | 0                                   |                     |    |                                               |        |
| SP 1024                      |      | M 2 OVC                                                                                                    | 3                   |           | F                                        |                                  |                     |                   | 03     | 03    |        | 027                           | THN SPTS 10VC                       |                     |    |                                               |        |
| SA 1056                      |      | M 2 OVC                                                                                                    | 3                   |           | F                                        | 251                              | 40.22               | 01                | 03     |       |        | 027                           | LSIS THN SPTS 10VC                  |                     |    |                                               |        |
| SP 1128                      |      | M 2 OVC                                                                                                    | 2                   |           | L-F                                      |                                  |                     |                   | 14     | 03    |        | 026                           |                                     |                     |    |                                               | (FIRI) |
| SP 1135                      |      | M 2 OVC                                                                                                    | 1 1/2               |           | L-F                                      |                                  |                     |                   | 07     | 03    |        | 026                           |                                     |                     |    |                                               |        |
| SP 1144                      |      | M 2 OVC                                                                                                    | 1                   |           | L-F                                      |                                  |                     |                   | 04     | 05    |        | 026                           |                                     |                     |    |                                               | (FIRI) |
| SA 1155                      |      | M 2 OVC                                                                                                    | 1                   |           | L-F                                      | 251                              | 40.39               | 36                | 04     |       |        | 027                           | L375                                |                     |    |                                               |        |
| SP 1217                      |      | E 2 OVC                                                                                                    | 3/4                 |           | L-F                                      |                                  |                     |                   | 03     | 05    |        | 026                           |                                     |                     |    |                                               |        |
| SA 1226                      |      | E 2 OVC                                                                                                    | 3/4                 |           | L-F                                      | 242                              | 41.39               | 07                | 04     |       |        | 026                           | 00000                               | 16                  | // |                                               |        |
| SA 1357                      |      | E 2 OVC                                                                                                    | 3/4                 |           | L-F                                      | 244                              | 41.40               | 07                | 04     |       |        | 025                           |                                     |                     |    |                                               |        |
| SA 1455                      |      | 25057 01/2                                                                                                 | 3/4                 |           | L-F                                      | 244                              | 42.40               | 04                | 03     |       |        | 025                           |                                     |                     |    |                                               |        |
| SA 1551                      |      | E 3 OVC                                                                                                    | 3/8                 |           | L-F                                      | 244                              | 41.40               | 07                | 05     |       |        | 025                           | 60300                               | 16                  | // | 42                                            |        |
| / /                          |      | 72791 20705                                                                                                | 12515               |           | 24405                                    | 0421                             | //                  | 04603             | 63235  | 70050 | 20015  | 44237                         | 0                                   |                     |    |                                               |        |
| SA 1606                      |      | E 3 OVC                                                                                                    | 3/8                 |           | L-F                                      | 242                              | 41.40               | 09                | 03     |       |        | 025                           |                                     |                     |    |                                               |        |
| SP 1731                      |      | E 3 BKN 7 OVC                                                                                              | 1                   |           | R-F                                      |                                  |                     |                   | 07     | 03    |        | 024                           |                                     |                     |    |                                               |        |
| SA 1756                      |      | E 3 BKN 7 OVC                                                                                              | 1                   |           | R-F                                      | 241                              | 41.40               | 12                | 03     |       |        | 024                           | LS 163016                           |                     |    |                                               |        |
| SP 1800                      |      | E 3 BKN 7 OVC                                                                                              | 2                   |           | R-F                                      |                                  |                     |                   | 10     | 03    |        | 024                           |                                     |                     |    |                                               | (FIRI) |
| SA 1856                      |      | E 2 BKN 7 OVC                                                                                              | 2                   |           | R-F                                      | 241                              | 41.39               | 07                | 05     |       |        | 024                           | 60214                               | 162                 | /  |                                               |        |
| SP 1956                      |      | E 2 BKN 6 OVC                                                                                              | 2                   |           | RE                                       | 241                              | 41.40               | 05                | 00     |       |        | 024                           |                                     |                     |    |                                               |        |
| SA 2056                      |      | E 2 BKN 6 OVC                                                                                              | 2                   |           | RE                                       | 241                              | 41.40               | 05                | 03     |       |        | 024                           |                                     |                     |    |                                               |        |
| SA 2156                      |      | M 2 OVC                                                                                                    | 2                   |           | R-F                                      | 237                              | 42.40               | 05                | 07     |       |        | 025                           | 60251                               | 16                  | // | 42                                            |        |
| / /                          |      | 72791 80507                                                                                                | 32416               |           | 23700                                    | 2711                             | //                  | 04803             | 63239  | 75170 | 20006  | 44237                         | 0                                   |                     |    |                                               |        |
| SP 2230                      |      | M 2 OVC                                                                                                    | 1                   |           | R-F                                      |                                  |                     |                   | 03     | 03    |        | 023                           |                                     |                     |    |                                               |        |
| RS 2250                      |      | M 2 OVC                                                                                                    | 2                   |           | L-F                                      | 239                              | 41.43               | 13                | 03     |       |        | 022                           | LS 163016                           |                     |    |                                               |        |
| SA 2320                      |      | M 4 OVC                                                                                                    | 3                   |           | L-F                                      |                                  |                     |                   | 20     | 14    | 620    | 024                           | WSHFT 01 FR 22                      |                     |    |                                               |        |
| SA 2356                      |      | M 4 OVC                                                                                                    | 3                   |           | L-F                                      | 239                              | 41.43               | 20                | 12     | 619   | 024    | 024                           | WSHFT 01 FR 23                      |                     |    |                                               |        |

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U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

STATION  
WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE  
JAN 21 1973  
TO CONVERT LIST TO GMT  
ADD 8 HRS. DEDUCT

| TIME  | TIME | SKY AND CLOUDS | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA LEVEL PRESS | TEMP       | WIND      | ALTITUDE | REMARKS AND SUPPLEMENTAL CODED DATA |
|-------|------|----------------|------------|------------------------------------|-----------------|------------|-----------|----------|-------------------------------------|
| TYPE  | TIME | SKY AND CLOUDS | HEIGHT     | TO VISION                          | IN INCHES       | IN DEGREES | DIRECTION | FEET     |                                     |
| R     | 0005 | BSC M7000      | 3          | L-F                                | 190.40          | 12.0       | 12        | 00       | 0005 BSC / 01200 1711               |
| SA    | 0105 | BSC 3500       | 3          | R-F                                | 197.45          | 41         | 30        | 03       | 0105 BSC 3500 4524 11000 1803       |
| SP    | 0205 | MIG 3000       | 2          | R-F                                |                 |            | 29        | 07       | 0205 MIG 3000                       |
| SP    | 0305 | BSC 1700       | 3          | R-F                                |                 |            | 30        | 12       | 0305 BSC 1700                       |
| SA    | 0405 | BSC 1700       | 3          | R-F                                | 193.42          | 40         | 30        | 10       | 0405 BSC 1700                       |
| SA    | 0505 | BSC 1700       | 3          | R-F                                | 197.41          | 39         | 31        | 07       | 0505 BSC 1700 / 30717 1511 41       |
| 72791 | 0607 | 4500           | 16         | 9705                               | 252             | 00         | 30        | 13       | 72791 0607 4500 9705 252 00 30 13   |
| SP    | 0705 | MIG 1000       | 5          | R-F                                |                 |            | 10        | 04       | 0705 MIG 1000                       |
| SA    | 0805 | MIG 1000       | 6          | R-F                                | 200.41          | 40         | 13        | 05       | 0805 MIG 1000                       |
| SA    | 0905 | MIG 1000       | 10         |                                    | 197.42          | 39         | 16        | 03       | 0905 MIG 1000                       |
| SA    | 1005 | MIG 1000       | 12         |                                    | 204.40          | 39         | 24        | 01       | 1005 MIG 1000                       |
| SA    | 1105 | MIG 1000       | 10         |                                    | 204.39          | 39         | 00        | 00       | 1105 MIG 1000                       |
| SA    | 1205 | MIG 1000       | 15         |                                    | 210.44          | 39         | 00        | 00       | 1205 MIG 1000                       |
| SA    | 1305 | MIG 1000       | 15         |                                    | 214.44          | 39         | 31        | 04       | 1305 MIG 1000                       |
| 72791 | 1404 | 7400           | 214        | 07                                 | 350             | 00         | 00        | 10       | 72791 1404 7400 214 07 350 00 00 10 |
| SA    | 1505 | MIG 1000       | 15         |                                    | 217.42          | 39         | 30        | 06       | 1505 MIG 1000                       |
| SA    | 1605 | MIG 1000       | 15         |                                    | 217.44          | 38         | 30        | 09       | 1605 MIG 1000                       |
| SA    | 1705 | MIG 1000       | 15         |                                    | 217.45          | 36         | 31        | 12       | 1705 MIG 1000                       |
| SA    | 1805 | MIG 1000       | 15         |                                    | 217.45          | 36         | 29        | 13       | 1805 MIG 1000                       |
| SA    | 1905 | MIG 1000       | 15         |                                    | 219.45          | 36         | 31        | 08       | 1905 MIG 1000                       |
| SA    | 2005 | MIG 1000       | 15         |                                    | 220.40          | 35         | 30        | 02       | 2005 MIG 1000                       |
| 72791 | 2109 | 7400           | 220        | 06                                 | 224             | 01         | 02        | 03       | 72791 2109 7400 220 06 224 01 02 03 |
| SA    | 2205 | MIG 1000       | 15         |                                    | 224.41          | 31         | 32        | 08       | 2205 MIG 1000                       |
| SA    | 2305 | MIG 1000       | 15         |                                    | 219.36          | 33         | 30        | 00       | 2305 MIG 1000                       |
| SA    | 0005 | MIG 1000       | 15         |                                    | 224.37          | 32         | 03        | 04       | 0005 MIG 1000                       |
| SA    | 0105 | MIG 1000       | 15         |                                    | 226.33          | 30         | 10        | 04       | 0105 MIG 1000                       |
| SA    | 0205 | MIG 1000       | 10         |                                    | 227.33          | 31         | 00        | 00       | 0205 MIG 1000                       |
| SA    | 0305 | MIG 1000       | 10         |                                    | 232.31          | 29         | 10        | 03       | 0305 MIG 1000                       |
| 72791 | 0409 | 6600           | 222        | 31                                 | 207             | 00         | 32        | 08       | 72791 0409 6600 222 31 207 00 32 08 |
| SA    | 0505 | MIG 1000       | 7          |                                    | 204.30          | 30         | 09        | 05       | 0505 MIG 1000                       |
| SA    | 0605 | MIG 1000       | 7          |                                    | 201.31          | 29         | 00        | 00       | 0605 MIG 1000                       |

[illegible]

| STATION                      |           | U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                     |       |                                             |                          |             |        |      |    |                        | STATION                 |                                     |
|------------------------------|-----------|------------------------------------------------------------------------------------------------------------|---------------------|-------|---------------------------------------------|--------------------------|-------------|--------|------|----|------------------------|-------------------------|-------------------------------------|
| WSO ASTORIA, ORE             |           |                                                                                                            |                     |       |                                             |                          |             |        |      |    |                        | DATE                    |                                     |
| JAN 28 1975                  |           |                                                                                                            |                     |       |                                             |                          |             |        |      |    |                        | TO CORRECT LIST TO SHIP |                                     |
| 100 6                        |           |                                                                                                            |                     |       |                                             |                          |             |        |      |    |                        | THE SUBTRACT            |                                     |
| SURFACE WEATHER OBSERVATIONS |           |                                                                                                            |                     |       |                                             |                          |             |        |      |    |                        |                         |                                     |
| TIME                         | TYPE      | SKY AND CLOUDS<br>REMARKS                                                                                  | VISIBILITY<br>MILES |       | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE | TEMPERATURE |        | WIND |    | WIND<br>SPEED<br>KNOTS | WIND<br>SPEED<br>KNOTS  | REMARKS AND SUPPLEMENTAL CODED DATA |
|                              |           |                                                                                                            | SEA                 | AIR   |                                             |                          | DIR         | SPEED  |      |    |                        |                         |                                     |
| 0056                         | -X        |                                                                                                            | 1/4                 |       | F                                           | 254                      | 27          | 24     | 00   | 00 | 029                    | F9                      | / 108                               |
| 0155                         | -X        |                                                                                                            | 1/4                 |       | F                                           | 253                      | 27          | 24     | 00   | 00 | 029                    | F7                      |                                     |
| 0220                         | -X        |                                                                                                            | 2                   |       | F                                           |                          |             |        | 00   | 00 | 029                    | F4                      |                                     |
| 0225                         | -X        |                                                                                                            | 1/2                 |       | F                                           |                          |             |        | 01   | 00 | 029                    | F9                      |                                     |
| 0257                         | -X        |                                                                                                            | 2 1/2               |       | F                                           | 258                      | 25          | 22     | 00   | 00 | 029                    | F3                      |                                     |
| 0356                         | -X        |                                                                                                            | 5                   |       | F                                           | 261                      | 25          | 23     | 00   | 00 | 03                     | F1                      | / 307 24 20031                      |
| 72791                        | 00000     | 58104                                                                                                      | 26154               | 00800 | 55307                                       | 02252                    | 20031       | 472240 |      |    |                        |                         |                                     |
| 0453                         | -X        |                                                                                                            | 5                   |       | F                                           | 261                      | 24          | 21     | 00   | 00 | 030                    | F1                      |                                     |
| 0553                         | -X        |                                                                                                            | 7                   |       | F                                           | 261                      | 25          | 22     | 00   | 00 | 030                    | F1                      |                                     |
| 0650                         | CLR       |                                                                                                            | 15                  |       |                                             | 263                      | 25          | 23     | 03   | 00 | 031                    | PTCHY                   | F / 302                             |
| 0725                         | -X        |                                                                                                            | 3/4                 |       | F                                           |                          |             |        | 00   | 00 | 031                    | F4                      |                                     |
| 0745                         | W O X     |                                                                                                            | 1/3                 |       | F                                           |                          |             |        | 00   | 00 | 032                    | (F1P1)                  |                                     |
| 0757                         | W O X     |                                                                                                            | 1/3                 |       | F                                           | 268                      | 24          | 20     | 00   | 00 | 032                    |                         |                                     |
| 0815                         | -X E V CL |                                                                                                            | 1/2                 |       | F                                           |                          |             |        | 00   | 00 | 032                    | F4                      |                                     |
| 0831                         | -X 4 CL   |                                                                                                            | 1/2                 |       | F                                           |                          |             |        | 00   | 00 | 032                    | F2                      | 1/324 HIR 5                         |
| 0850                         | CLR       |                                                                                                            | 1                   |       | F                                           | 268                      | 27          | 25     | 03   | 00 | 032                    |                         | 1/324 HIR 5                         |
| 0900                         | CLR       |                                                                                                            | 3                   |       | F                                           |                          |             |        | 00   | 00 | 032                    | F2V                     | HIR 5                               |
| 0950                         | CLR       |                                                                                                            | 3                   |       | F                                           | 271                      | 24          | 24     | 00   | 00 | 033                    | F2V                     | HIR 5-6W / 208 23                   |
| 72791                        | 00000     | 43104                                                                                                      | 27151               | 00900 | 55275                                       | 03005                    | 20035       | 43123  |      |    |                        |                         |                                     |
| 1050                         | CLR       |                                                                                                            | 10                  |       |                                             | 268                      | 32          | 30     | 00   | 00 | 032                    | F2V                     | F 10W-11                            |
| 1150                         | CLR       |                                                                                                            | 15                  |       |                                             | 241                      | 37          | 31     | 07   | 05 | 030                    | F2V                     | CU                                  |
| 1200                         | CLR       |                                                                                                            | 15                  |       |                                             | 247                      | 39          | 30     | 04   | 05 | 027                    | F2V                     | CU / 922 1100                       |
| 1240                         | CLR       |                                                                                                            | 15                  |       |                                             | 241                      | 39          | 31     | 01   | 06 | 024                    | F2V                     | CU                                  |
| 1300                         | CLR       |                                                                                                            | 15                  |       |                                             | 237                      | 40          | 30     | 03   | 07 | 020                    | F2V                     | CU                                  |
| 1550                         | CLR       |                                                                                                            | 15                  |       |                                             | 237                      | 38          | 30     | 04   | 07 | 020                    | F2V                     | CU / 1000 1100 110                  |
| 72791                        | 10407     | 74020                                                                                                      | 22703               | 11500 | 51412                                       | 02005                    | 40000       |        |      |    |                        |                         |                                     |
| 1650                         | 850 - 850 |                                                                                                            | 15                  |       |                                             | 224                      | 26          | 27     | 07   | 05 | 022                    | F2V                     | CU                                  |
| 1750                         | 850 - 850 |                                                                                                            | 15                  |       |                                             | 221                      | 24          | 28     | 07   | 05 | 021                    |                         |                                     |
| 1850                         | 850 - 850 |                                                                                                            | 12                  |       |                                             | 221                      | 26          | 27     | 07   | 05 | 021                    | F2V                     | CU 10016                            |
| 1950                         | 850 - 850 |                                                                                                            | 10                  |       |                                             | 227                      | 31          | 27     | 09   | 05 | 021                    |                         |                                     |
| 2050                         | 850 - 850 |                                                                                                            | 10                  |       |                                             | 227                      | 27          | 27     | 07   | 05 | 020                    | F                       | CU 10022 1)                         |
| 2150                         | 850 - 850 |                                                                                                            | 10                  |       |                                             | 224                      | 27          | 27     | 07   | 05 | 020                    | F2V                     | CU 10022 40                         |
| 72791                        | 20705     | 14021                                                                                                      | 22453               | 00900 | 51507                                       | 02015                    | 40020       |        |      |    |                        |                         |                                     |
| 2250                         | CLR       |                                                                                                            | 10                  |       |                                             | 220                      | 27          | 25     | 07   | 05 | 020                    | F2V                     | CU                                  |
| 2350                         | CLR       |                                                                                                            | 10                  |       |                                             | 217                      | 26          | 25     | 06   | 05 | 020                    |                         |                                     |

WFO ASTORIA, ORE

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

FEB 07 1979

TO CONT. REPORT TO THE  
NATIONAL WEATHER SERVICE

SURFACE WEATHER OBSERVATIONS

| TIME    | SEA AND CEILING   | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA STATE | TEMPERATURE | WIND  | WAVE  | REMARKS AND SUPPLEMENTAL CODED DATA |
|---------|-------------------|------------|------------------------------------|-----------|-------------|-------|-------|-------------------------------------|
| 19 0056 | 456T 1056T ELS 0V | 6          | R-                                 | 153.45    | 17.25       | 09    | 773   | 2070 172/                           |
| SA 0156 | 456T 1056T ELS 0V | 7          | R-                                 | 160.44    | 17.25       | 07    | 720   |                                     |
| SA 0256 | 1456T ELS 0V      | 10         |                                    | 166.43    | 24          | 06    | 002   | 1000 R-                             |
| SA 0356 | 2456T ELS 0V      | 10         |                                    |           | 23          | 06    | 003   | 1000 R-                             |
| SA 0456 | 2556T ELS 0V      | 10         |                                    | 175.42    | 27          | 10    | 004   | 1000 R- / 220B 1500 41 20/19        |
| ///     | 72791 72710 66216 | 17206      | 785                                | 04220     | 63164       | 1350  | 20169 | 44941                               |
| SA 0556 | 2556T ELS 0V      | 10         |                                    | 176.40    | 26          | 05    | 005   |                                     |
| SA 0656 | 2556T ELS 0V      | 10         |                                    | 180.40    | 26          | 03    | 006   |                                     |
| SA 0756 | 2556T ELS 0V      | 15         |                                    | 190.37    | 26          | 00    | 007   | 217 1500                            |
| SA 0856 | 2556T ELS 0V      | 10         | RW-                                |           | 14          | 03    | 010   |                                     |
| SA 0956 | 2556T ELS 0V      | 10         | RW-                                | 234.38    | 26          | 00    | 013   | 1324 RINOV                          |
| SA 1056 | 2556T ELS 0V      | 12         |                                    |           | 14          | 05    | 013   |                                     |
| SA 1156 | 2556T ELS 0V      | 12         |                                    | 214.39    | 37          | 16    | 016   | 1575                                |
| SA 1256 | 2556T ELS 0V      | 12         |                                    | 220.41    | 39          | 12    | 017   | 22003 1578 34                       |
| ///     | 72791 21207 69022 | 22005      | 25675                              | 04220     | 63212       | 70320 | 20124 | 44934                               |
| SA 1356 | 2556T ELS 0V      | 12         |                                    | 227.45    | 40          | 13    | 020   |                                     |
| SA 1456 | 2556T ELS 0V      | 12         |                                    | 231.47    | 39          | 22    | 07    | 020                                 |
| SA 1556 | 2556T ELS 0V      | 12         |                                    | 234.47    | 39          | 22    | 07    | 019 003 1908                        |
| SA 1656 | 2556T ELS 0V      | 12         |                                    | 234.47    | 39          | 22    | 09    | 019                                 |
| ///     | 25000             |            |                                    |           |             |       |       |                                     |
| SA 1756 | 2556T ELS 0V      | 12         |                                    | 227.47    | 39          | 22    | 07    | 020                                 |
| L 1800  | 2556T ELS 0V      | 12         |                                    | 46        | 37          | 22    | 07    | 020                                 |
| SA 1900 | 2556T ELS 0V      | 12         |                                    | 231.46    | 39          | 22    | 07    | 021 307 157/ 47                     |
| ///     | 72791 22207 69022 | 23108      | 35471                              | 04307     | 63222       | 20093 | 44834 |                                     |
| SA 2000 | 2556T ELS 0V      | 12         |                                    | 232.45    | 38          | 19    | 06    | 022                                 |
| SA 2100 | 2556T ELS 0V      | 12         |                                    | 229.45    | 37          | 12    | 04    | 021                                 |
| SA 2200 | 2556T ELS 0V      | 12         |                                    | 227.44    | 38          | 14    | 04    | 020 302 157/                        |
| SA 2300 | 2556T ELS 0V      | 7          | R-                                 | 230.44    | 38          | 13    | 03    | 020 R015                            |
| SA 2400 | 2556T ELS 0V      | 7          | R-                                 | 232.42    | 38          | 00    | 00    | 019                                 |
| SA 2500 | 2556T ELS 0V      | 8          |                                    | 215.42    | 39          | 07    | 05    | 017 RE 15 31201 157/ 47             |
| ///     | 72791 22207 69022 | 23216      | 31506                              | 85511     | 34812       | 63207 | 70120 | 20017 44834                         |
| SA 2600 | 2556T ELS 0V      | 8          |                                    | 209.42    | 39          | 10    | 04    | 015                                 |
| SA 2700 | 2556T ELS 0V      | 8          | R-F                                | 204.42    | 39          | 08    | 05    | 013 1503                            |

WFO 104  
1277

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

STATION

WSO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE

FEB 11 1979

TO CONVERT LIST TO SUR  
FAC. 5 MIN. SUBTRACT

| TIME | SEA AND CEILING | VISIBILITY | WEATHER AND OBSTRUCTIONS TO VISION | SEA LEVEL PRESSURE | TEMPERATURE | WIND | WIND DIRECTION | WIND SPEED | WIND GUSTS | WIND VELOCITY | WIND DIRECTION | WIND SPEED | WIND GUSTS | WIND VELOCITY | REMARKS AND SUPPLEMENTAL CODED DATA |
|------|-----------------|------------|------------------------------------|--------------------|-------------|------|----------------|------------|------------|---------------|----------------|------------|------------|---------------|-------------------------------------|
| 0000 | M1000           | 3          | L-F                                | 102.45             | 45          | 21   | 07             | 000        | 21002      | 16//          |                |            |            |               |                                     |
| 0100 | M1000           | 5          | L-F                                | 102.45             | 44          | 21   | 07             | 000        |            |               |                |            |            |               |                                     |
| 0200 | M1000           | 6          | F                                  | 102.45             | 44          | 00   | 00             | 000        | INTMT L-   |               |                |            |            |               |                                     |
| 0300 | M1000           | 3          | L-F                                | 102.45             | 44          | 21   | 03             | 000        | 10203      | 16//          | 45             | 20083      |            |               |                                     |
| 0400 | M1000           | 4          | L-F                                | 102.45             | 44          | 21   | 03             | 000        | 10204      | 16//          | 45             | 20083      | 449450     |               |                                     |
| 0500 | M1000           | 5          | L-F                                | 102.47             | 44          | 20   | 07             | 000        |            |               |                |            |            |               |                                     |
| 0600 | M1000           | 6          | L-F                                | 102.47             | 44          | 19   | 02             | 000        |            |               |                |            |            |               |                                     |
| 0700 | M1000           | 6          | L-F                                | 102.43             | 44          | 19   | 02             | 000        | 40001      | 16//          |                |            |            |               |                                     |
| 0800 | M1000           | 5          | L-F                                | 102.43             | 44          | 17   | 02             | 000        |            |               |                |            |            |               |                                     |
| 0900 | M1000           | 2          | R-F                                |                    |             | 14   | 06             | 000        |            |               |                |            |            |               |                                     |
| 1000 | M1000           | 2          | R-F                                |                    |             | 15   | 05             | 000        |            |               |                |            |            |               | (F101)                              |
| 1100 | M1000           | 10         |                                    | 102.48             | 47          | 12   | 04             | 000        | 10210      | 16//          | 45             | 20083      |            |               |                                     |
| 1200 | M1000           | 6          | R-F                                |                    |             | 18   | 13             | 000        |            |               |                |            |            |               | (F101)                              |
| 1300 | M1000           | 6          | R-F                                | 102.48             | 47          | 21   | 12             | 000        | 10213      | 16//          | 45             | 20083      |            |               |                                     |
| 1400 | M1000           | 10         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10214      | 16//          | 45             | 20083      |            |               |                                     |
| 1500 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10215      | 16//          | 45             | 20083      |            |               |                                     |
| 1600 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10216      | 16//          | 45             | 20083      |            |               |                                     |
| 1700 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10217      | 16//          | 45             | 20083      |            |               |                                     |
| 1800 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10218      | 16//          | 45             | 20083      |            |               |                                     |
| 1900 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10219      | 16//          | 45             | 20083      |            |               |                                     |
| 2000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10220      | 16//          | 45             | 20083      |            |               |                                     |
| 2100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10221      | 16//          | 45             | 20083      |            |               |                                     |
| 2200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10222      | 16//          | 45             | 20083      |            |               |                                     |
| 2300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10223      | 16//          | 45             | 20083      |            |               |                                     |
| 0000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10224      | 16//          | 45             | 20083      |            |               |                                     |
| 0100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10225      | 16//          | 45             | 20083      |            |               |                                     |
| 0200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10226      | 16//          | 45             | 20083      |            |               |                                     |
| 0300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10227      | 16//          | 45             | 20083      |            |               |                                     |
| 0400 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10228      | 16//          | 45             | 20083      |            |               |                                     |
| 0500 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10229      | 16//          | 45             | 20083      |            |               |                                     |
| 0600 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10230      | 16//          | 45             | 20083      |            |               |                                     |
| 0700 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10231      | 16//          | 45             | 20083      |            |               |                                     |
| 0800 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10232      | 16//          | 45             | 20083      |            |               |                                     |
| 0900 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10233      | 16//          | 45             | 20083      |            |               |                                     |
| 1000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10234      | 16//          | 45             | 20083      |            |               |                                     |
| 1100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10235      | 16//          | 45             | 20083      |            |               |                                     |
| 1200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10236      | 16//          | 45             | 20083      |            |               |                                     |
| 1300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10237      | 16//          | 45             | 20083      |            |               |                                     |
| 1400 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10238      | 16//          | 45             | 20083      |            |               |                                     |
| 1500 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10239      | 16//          | 45             | 20083      |            |               |                                     |
| 1600 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10240      | 16//          | 45             | 20083      |            |               |                                     |
| 1700 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10241      | 16//          | 45             | 20083      |            |               |                                     |
| 1800 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10242      | 16//          | 45             | 20083      |            |               |                                     |
| 1900 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10243      | 16//          | 45             | 20083      |            |               |                                     |
| 2000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10244      | 16//          | 45             | 20083      |            |               |                                     |
| 2100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10245      | 16//          | 45             | 20083      |            |               |                                     |
| 2200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10246      | 16//          | 45             | 20083      |            |               |                                     |
| 2300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10247      | 16//          | 45             | 20083      |            |               |                                     |
| 0000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10248      | 16//          | 45             | 20083      |            |               |                                     |
| 0100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10249      | 16//          | 45             | 20083      |            |               |                                     |
| 0200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10250      | 16//          | 45             | 20083      |            |               |                                     |
| 0300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10251      | 16//          | 45             | 20083      |            |               |                                     |
| 0400 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10252      | 16//          | 45             | 20083      |            |               |                                     |
| 0500 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10253      | 16//          | 45             | 20083      |            |               |                                     |
| 0600 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10254      | 16//          | 45             | 20083      |            |               |                                     |
| 0700 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10255      | 16//          | 45             | 20083      |            |               |                                     |
| 0800 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10256      | 16//          | 45             | 20083      |            |               |                                     |
| 0900 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10257      | 16//          | 45             | 20083      |            |               |                                     |
| 1000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10258      | 16//          | 45             | 20083      |            |               |                                     |
| 1100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10259      | 16//          | 45             | 20083      |            |               |                                     |
| 1200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10260      | 16//          | 45             | 20083      |            |               |                                     |
| 1300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10261      | 16//          | 45             | 20083      |            |               |                                     |
| 1400 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10262      | 16//          | 45             | 20083      |            |               |                                     |
| 1500 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10263      | 16//          | 45             | 20083      |            |               |                                     |
| 1600 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10264      | 16//          | 45             | 20083      |            |               |                                     |
| 1700 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10265      | 16//          | 45             | 20083      |            |               |                                     |
| 1800 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10266      | 16//          | 45             | 20083      |            |               |                                     |
| 1900 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10267      | 16//          | 45             | 20083      |            |               |                                     |
| 2000 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10268      | 16//          | 45             | 20083      |            |               |                                     |
| 2100 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10269      | 16//          | 45             | 20083      |            |               |                                     |
| 2200 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10270      | 16//          | 45             | 20083      |            |               |                                     |
| 2300 | M1000           | 12         |                                    | 102.48             | 47          | 21   | 12             | 000        | 10271      | 16//          | 45             | 20083      |            |               |                                     |

WFO-10A  
5-7-77

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE

FEB 22 1979

TO CONVERT CST TO GMT  
ADD 8 HRS. SUBTRACT

| TIME   | SKY AND CEILING<br>Height in Feet | VISIBILITY  |           | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESS. | TEMP. | DEW<br>PT. | WIND  |                  |       |       | ALTIMETER<br>SETTING | REMARKS AND SUPPLEMENTAL CODED DATA |
|--------|-----------------------------------|-------------|-----------|---------------------------------------------|------------------------|-------|------------|-------|------------------|-------|-------|----------------------|-------------------------------------|
|        |                                   | UNFAVORABLE | FAVORABLE |                                             |                        |       |            | REF.  | APPROX.          | MAX.  | MIN.  |                      |                                     |
| A 0056 | E35 OVC                           | 10          |           |                                             | 0513837                | 09    | 07         | 968   | 605              | 1500  |       |                      |                                     |
| A 0156 | E35 OVC                           | 10          |           |                                             | 0484038                | 08    | 05         | 967   |                  |       |       |                      |                                     |
| A 0256 | E35 OVC                           | 10          |           |                                             | 0483938                | 08    | 06         | 967   |                  |       |       |                      |                                     |
| P 0339 | R25 OVC                           | 10          |           |                                             |                        | 08    | 05         | 967   |                  |       |       |                      | (F1A1)                              |
| A 0356 | 15 SCT E25 OVC                    | 10          |           | RW-                                         | 0484038                | 08    | 06         | 967   | 6300             | 1500  | 37    |                      |                                     |
| /      | /                                 | 72791       | 60506     | 66502                                       | 04804                  | 354   | //         | 07603 | 63039            | 72010 | 44037 | 0                    |                                     |
| A 0456 | ER BKN 75 OVC                     | 10          |           | RW-                                         | 0483938                | 05    | 05         | 967   |                  |       |       |                      |                                     |
| A 0556 | 14 SCT E25 OVC                    | 10          |           |                                             | 0483938                | 07    | 07         | 968   | 6515             |       |       |                      |                                     |
| A 0656 | 15 SCT E25 OVC                    | 15          |           |                                             | 0483736                | 09    | 06         | 968   | 60300            | 1500  |       |                      |                                     |
| P 0704 | 15 SCT 200 - BKN                  | 15          |           |                                             |                        | 07    | 08         | 968   |                  |       |       |                      | (F12)                               |
| A 0756 | 15 SCT 700 - BKN                  | 15          |           |                                             | 0413837                | 07    | 08         | 968   |                  |       |       |                      |                                     |
| A 0856 | 35 SCT 200 SCT                    | 5           |           |                                             | 0414139                | 07    | 11         | 968   |                  |       |       |                      |                                     |
| A 0956 | 55 BKN 900 BKN                    | 15          |           |                                             | 0414439                | 07    | 09         | 968   | 60300            | 1879  | 57    |                      |                                     |
| /      | /                                 | 200 BKN     |           |                                             |                        |       |            |       |                  |       |       |                      |                                     |
| /      | /                                 | 72791       | 60708     | 74028                                       | 04107                  | 58478 | 04608      | 63032 | 70050            | 44437 | 0     |                      |                                     |
| A 1056 | FUS BKN 200 BKN                   | 12          |           |                                             | 0234532                | 12    | 07         | 969   | RWU DONT E AND S |       |       |                      |                                     |
| P 1132 | M 25 BKN -5 OVC                   | 12          |           |                                             |                        | 06    | 05         | 963   | RWU DONT SW      |       |       |                      |                                     |
| A 1155 | 10 SCT M20 BKN -5 OVC             | 15          |           |                                             | 0344539                | 10    | 03         | 963   |                  |       |       |                      |                                     |
| A 1256 | 15 SCT M20 BKN -5 OVC             | 15          |           |                                             | 0274841                | 09    | 11         | 961   | 714              | 1511  |       |                      |                                     |
| A 1355 | 15 SCT M20 BKN -5 OVC             | 15          |           |                                             | 0244739                | 09    | 12         | 961   | 1300             | 1511  |       |                      |                                     |
| P 1430 | 15 SCT 200 - BKN                  | 15          |           |                                             |                        | 14    | 11         | 962   | RWU DONT S-W     |       |       |                      |                                     |
| A 1455 | 50 SCT M45 OVC                    | 15          |           |                                             | 0214738                | 10    | 10         | 957   | RWU DONT SW-W    |       |       |                      |                                     |
| A 1555 | M30 BKN -5 OVC                    | 15          |           |                                             | 0214532                | 11    | 09         | 967   | 607              | 1511  | 47    |                      |                                     |
| /      | /                                 | 72791       | 21109     | 74022                                       | 02107                  | 25471 | 03607      | 63012 | 44037            | 0     |       |                      |                                     |
| A 1657 | 15 SCT M41 OVC                    | 15          |           |                                             | 0244438                | 14    | 03         | 960   | RWU DONT         |       |       |                      |                                     |
| A 1756 | 15 SCT M41 OVC                    | 10          |           |                                             | 0224339                | 06    | 06         | 960   | RWU DONT         |       |       |                      |                                     |
| A 1857 | 15 SCT M42 OVC                    | 10          |           |                                             | 0244240                | 18    | 05         | 960   | RWU DONT / 30501 | 1511  |       |                      |                                     |
| A 1955 | 15 SCT M43 OVC                    | 7           |           | R-                                          | 0244140                | 15    | 03         | 960   | RWU DONT         |       |       |                      |                                     |
| A 2055 | 15 SCT M45 OVC                    | 7           |           | R-                                          | 0264137                | 06    | 07         | 961   | RWU DONT         |       |       |                      |                                     |
| A 2156 | 15 SCT M43 OVC                    | 10          |           |                                             | 0294138                | 09    | 06         | 962   | 613              | 30501 | 1500  | 48                   |                                     |
| /      | /                                 | 72791       | 60708     | 60016                                       | 02905                  | 65460 | 03305      | 63020 | 70110            | 20001 | 44037 | 0                    |                                     |
| A 2256 | 15 SCT M43 OVC                    | 10          |           |                                             | 0314038                | 09    | 05         | 962   | 616              | 1500  |       |                      |                                     |
| A 2356 | 15 SCT M43 OVC                    | 10          |           |                                             | 0313937                | 08    | 08         | 962   | 616              | 1500  |       |                      |                                     |

| STATION                      |          | U.S. DEPARTMENT OF COMMERCE<br>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION<br>NATIONAL WEATHER SERVICE |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          | STATION                             |  |                                                 |  |
|------------------------------|----------|------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------|--------------------------|---------------------|---------------------------------------|------------------------------------------|-------------------------------------------|--------------------------|--------------------------|-------------------------------------|--|-------------------------------------------------|--|
| WSO ASTORIA, ORE             |          |                                                                                                            |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          | DATE                                |  |                                                 |  |
| SURFACE WEATHER OBSERVATIONS |          |                                                                                                            |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          | FEB 27 1973                         |  | TO CONVERT LIST TO GMT<br>ADD 8 HRS. SUBTRACT 1 |  |
| TIME                         | TYPE     | SKY AND CEILING<br>(HOURS IN 24 HRS.)                                                                      | VISIBILITY<br>(MILES) | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE | TEMPERATURE<br>(°F) | WIND<br>DIRECTION<br>SPEED<br>(KNOTS) | WAVE<br>DIRECTION<br>PERIOD<br>(SECONDS) | SWELL<br>DIRECTION<br>PERIOD<br>(SECONDS) | WIND<br>SPEED<br>(KNOTS) | WAVE<br>HEIGHT<br>(FEET) | REMARKS AND SUPPLEMENTAL CODED DATA |  |                                                 |  |
| SA 0056                      | 10 SCT   | M16 OVC                                                                                                    | 6                     | R-                                          |                          | 171 43 11           | 19 15021 034                          | 72013                                    | 172/                                      |                          |                          |                                     |  |                                                 |  |
| SA 0156                      | 10 SCT   | M16 OVC                                                                                                    | 6                     | R-                                          |                          | 160 44 42           | 16 16025 000                          | 3- CENL R                                |                                           |                          |                          |                                     |  |                                                 |  |
| SA 0256                      | MAIN BKN | 25 AUC                                                                                                     | 6                     | R                                           |                          | 163 43 41           | 24 14024 001                          | W511T 20 FROD                            |                                           |                          |                          |                                     |  |                                                 |  |
| RS 0356                      | 4 SCT    | M14 OVC                                                                                                    | 5                     | R                                           |                          | 163 42 40           | 23 007                                | 001 50012                                | M11 42 20066                              |                          |                          |                                     |  |                                                 |  |
| / /                          | 72791    | 52309                                                                                                      | 55426                 | 16306                                       | 87211                    | 04508               | 163151                                | 73270                                    | 20066                                     | 447420                   |                          |                                     |  |                                                 |  |
| SA 0456                      | 4 SCT    | E14 BKN 30 OVC                                                                                             | 5                     |                                             |                          | 161 41 40           | 15 05                                 | 001 3526                                 |                                           |                          |                          |                                     |  |                                                 |  |
| SA 0556                      | 4 SCT    | E15 BKN 30 OVC                                                                                             | 5                     |                                             |                          | 163 40 40           | 09 001                                | 001                                      |                                           |                          |                          |                                     |  |                                                 |  |
| SA 0656                      | 4 SCT    | M14 BKN 30 AUC                                                                                             | 15                    | RW-                                         |                          | 163 40 39           | 10 07                                 | 001 35014                                | 1911                                      | 35014                    |                          |                                     |  |                                                 |  |
| SA 0756                      | 15 SCT   | E14 BKN 30 OVC                                                                                             | 15                    |                                             |                          | 173 40 38           | 02 10                                 | 1620 35014                               | 114V 20                                   | 16025 31000              | 3- W                     |                                     |  |                                                 |  |
| SA 0856                      | E14 BKN  | 22 BKN                                                                                                     | 12                    |                                             |                          | 175 42 37           | 14 06                                 | 005 14000                                | V 30T                                     |                          |                          |                                     |  |                                                 |  |
| RS 0956                      | 14 SCT   | 22 SCT                                                                                                     | 12                    |                                             |                          | 178 43 40           | 14 06                                 | 005 14000                                | SE / 21505                                | 1903                     | 40                       |                                     |  |                                                 |  |
| /                            | /        | 250 SCT                                                                                                    |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          |                                     |  |                                                 |  |
| / /                          | 72791    | 21406                                                                                                      | 69153                 | 17306                                       | 69403                    | 04215               | 163159                                | 70530                                    | 20069                                     | 445400                   |                          |                                     |  |                                                 |  |
| SA 1056                      | 16 SCT   | 22 SCT                                                                                                     | 15                    |                                             |                          | 178 45 42           | 02 05                                 | 005 16000                                | V 30T                                     |                          |                          |                                     |  |                                                 |  |
| SA 1156                      | 16 SCT   | 22 SCT                                                                                                     | 15                    |                                             |                          | 176 47 41           | 12 09                                 | 005 16000                                | TCU ALGOS                                 |                          |                          |                                     |  |                                                 |  |
| SA 1256                      | 14 SCT   | 250 SCT                                                                                                    | 15                    |                                             |                          | 171 49 40           | 23 11                                 | 001 16000                                | SW TCU ALGOS                              | RW DINT                  |                          |                                     |  |                                                 |  |
| /                            | /        | 807 1903                                                                                                   |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          |                                     |  |                                                 |  |
| SA 1356                      | 14 SCT   | 22 SCT 250 SCT                                                                                             | 15                    |                                             |                          | 168 48 37           | 23 10                                 | 003 16000                                | ALGOS                                     | RW 3- SW                 |                          |                                     |  |                                                 |  |
| SA 1456                      | 14 SCT   | 22 SCT 250 SCT                                                                                             | 15                    |                                             |                          | 163 46 37           | 23 09                                 | 001 16000                                | SW-ALGOS                                  | RW DINT                  |                          |                                     |  |                                                 |  |
| /                            | /        | TCU ALGOS                                                                                                  |                       |                                             |                          |                     |                                       |                                          |                                           |                          |                          |                                     |  |                                                 |  |
| SA 1556                      | 19 SCT   | 250 SCT                                                                                                    | 15                    |                                             |                          | 160 48 39           | 23 12                                 | 000 16000                                | SW TCU ALGOS                              | RW DINT                  |                          |                                     |  |                                                 |  |
| /                            | /        | 712 1903                                                                                                   | 50                    |                                             |                          |                     |                                       |                                          |                                           |                          |                          |                                     |  |                                                 |  |
| / /                          | 72791    | 22312                                                                                                      | 74150                 | 16009                                       | 29403                    | 04712               | 163151                                | 20069                                    | 450400                                    |                          |                          |                                     |  |                                                 |  |
| SA 1656                      | 30 SCT   |                                                                                                            | 15                    |                                             |                          | 154 47 38           | 21 08                                 | 009                                      |                                           |                          |                          |                                     |  |                                                 |  |
| SA 1756                      | 20 SCT   |                                                                                                            | 15                    |                                             |                          | 149 44 37           | 18 05                                 | 009                                      | TCU 3                                     |                          |                          |                                     |  |                                                 |  |
| SA 1856                      | 22 SCT   |                                                                                                            | 10                    |                                             |                          | 144 39 36           | 14 05                                 | 006                                      | 715                                       | 1200                     |                          |                                     |  |                                                 |  |
| SA 1956                      | 22 SCT   |                                                                                                            | 10                    |                                             |                          | 158 36 35           | 13 06                                 | 004                                      |                                           |                          |                          |                                     |  |                                                 |  |
| SA 2056                      | 22 SCT   | 250 SCT                                                                                                    | 10                    |                                             |                          | 152 35 34           | 13 05                                 | 002                                      |                                           |                          |                          |                                     |  |                                                 |  |
| RS 2156                      | 200 SCT  | 250 SCT                                                                                                    | 10                    |                                             |                          | 159 36 35           | 11 04                                 | 001                                      | 715                                       | 1447                     | 50                       |                                     |  |                                                 |  |
| / /                          | 72791    | 22312                                                                                                      | 74150                 | 16009                                       | 29403                    | 04712               | 163151                                | 20069                                    | 450400                                    |                          |                          |                                     |  |                                                 |  |
| SA 2256                      | 20 SCT   | 250 SCT                                                                                                    | 10                    |                                             |                          | 152 37 36           | 12 05                                 | 009                                      |                                           |                          |                          |                                     |  |                                                 |  |
| SA 2356                      | 20 SCT   | 250 SCT                                                                                                    | 10                    |                                             |                          | 152 37 36           | 12 05                                 | 009                                      |                                           |                          |                          |                                     |  |                                                 |  |
| SA 2456                      | 20 SCT   | 250 SCT                                                                                                    | 10                    |                                             |                          | 152 37 36           | 12 05                                 | 009                                      |                                           |                          |                          |                                     |  |                                                 |  |



1510104  
1000

U.S. DEPARTMENT OF COMMERCE  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL WEATHER SERVICE

WFO ASTORIA, ORE

SURFACE WEATHER OBSERVATIONS

DATE MAR 14 1979  
TO CONVERT LIST TO DAT  
ADD 2000 HRS. SUBTRACT

| TIME<br>Z | SKY AND CEILING<br>HEIGHT IN FEET | VISIBILITY<br>MILES |          | WEATHER<br>AND<br>OBSTRUCTIONS<br>TO VISION | SEA<br>LEVEL<br>PRESSURE | TEMPERATURE |     | WIND |       | WIND<br>SPEED<br>IN KNOTS | REMARKS AND SUPPLEMENTAL CODED DATA |
|-----------|-----------------------------------|---------------------|----------|---------------------------------------------|--------------------------|-------------|-----|------|-------|---------------------------|-------------------------------------|
|           |                                   | STATUTE             | NAUTICAL |                                             |                          | AIR         | SEA | DIR  | SPEED |                           |                                     |
| 2005L     | 11 SCT M14 OVC                    | 10                  |          |                                             | 195.49                   | 46          | 32  | 05   | 011   | 105                       | 15 //                               |
| 2015L     | 11 SCT M14 OVC                    | 10                  |          |                                             | 195.47                   | 45          | 07  | 05   | 012   |                           |                                     |
| 2035L     | 11 SCT M15 OVC                    | 10                  |          |                                             | 193.46                   | 45          | 00  | 00   | 010   |                           |                                     |
| 2055L     | 11 SCT M15 OVC                    | 10                  |          |                                             | 192.77                   | 45          | 13  | 04   | 010   | 003                       | 15 // Y6                            |
| 2105L     | 11 SCT M15 OVC                    | 10                  |          | 19208                                       | 85.4                     | 11          | 07  | 00   | 63    | 193                       | 47744.78 MIXED                      |
| 2055L     | 13 SCT M15 OVC                    | 15                  |          |                                             | 193.45                   | 44          | 09  | 04   | 009   |                           |                                     |
| 2055L     | 13 SCT M15 OVC                    | 15                  |          |                                             | 197.44                   | 43          | 17  | 04   | 005   |                           |                                     |
| 2055L     | M15 AKN 1000 FT OVC               | 15                  |          |                                             | 197.43                   | 42          | 12  | 04   | 005   | 105                       | 1572                                |
| 2073L     | M15 AKN 2500 FT OVC               | 10                  |          |                                             |                          |             | 00  | 04   | 005   | 1000                      | FL200                               |
| 2075L     | M15 AKN 2500 FT OVC               | 10                  |          |                                             | 197.42                   | 44          | 07  | 03   | 009   | 1000                      | FL200                               |
| 2100L     | M15 AKN 2500 FT OVC               | 10                  |          |                                             |                          |             | 07  | 06   | 003   |                           | (F131)                              |
| 2030L     | M15 AKN 2500 FT OVC               | 12                  |          |                                             | 187.49                   | 46          | 04  | 07   | 003   |                           |                                     |
| 2053L     | M15 AKN 2500 FT OVC               | 15                  |          |                                             | 187.53                   | 45          | 21  | 12   | 007   | 400                       | 1508 43                             |
| 2100L     | 22791 82112 74022                 | 18712               | 75408    | 07400                                       | 63179                    | 45343       |     |      |       |                           |                                     |
| 2105L     | M23 AKN 2500 FT OVC               | 15                  |          |                                             | 187.53                   | 45          | 22  | 15   | 003   |                           |                                     |
| 2105L     | M23 AKN 2500 FT OVC               | 15                  |          |                                             | 183                      | 55          | 45  | 23   | 12    | 007                       | 2330N V SCT                         |
| 2120L     | 2250 75 5000 FT OVC               | 15                  |          |                                             |                          |             | 16  | 12   | 007   | 2400                      | SE-SW                               |
| 2125L     | 2250 75 5000 FT OVC               | 15                  |          |                                             | 193.55                   | 44          | 19  | 15   | 023   | 007                       | 603 1578                            |
| 2134L     | M26 AKN 7500 FT OVC               | 15                  |          |                                             |                          |             | 21  | 14   | 005   |                           |                                     |
| 2135L     | M26 AKN 7500 FT OVC               | 15                  |          |                                             | 176.55                   | 45          | 22  | 12   | 020   | 005                       |                                     |
| 2145L     | M26 AKN 7500 FT OVC               | 15                  |          |                                             | 173.56                   | 45          | 21  | 13   | 004   | 000                       | 0000 0000 0000                      |
| 2155L     | M26 AKN 2500 FT OVC               | 5                   |          |                                             | 173.55                   | 45          | 19  | 14   | 024   | 000                       | 010 1508 56                         |
| 2200L     | 22791 82114 74022                 | 17313               | 75508    | 07410                                       | 63168                    | 45343       |     |      |       |                           |                                     |
| 2205L     | M26 AKN 2500 FT OVC               | 15                  |          |                                             | 170.50                   | 47          | 13  | 16   | 035   | 003                       |                                     |
| 2205L     | E2500 75 5000 FT OVC              | 15                  |          |                                             | 170.53                   | 47          | 17  | 14   | 051   | 003                       |                                     |
| 2205L     | E2500 75 5000 FT OVC              | 15                  |          |                                             | 170.51                   | 49          | 13  | 12   | 020   | 003                       | 0000 15 //                          |
| 2205L     | E2500 75 5000 FT OVC              | 15                  |          |                                             | 168.51                   | 49          | 13  | 17   | 003   |                           |                                     |
| 2205L     | M26 AKN 2500 FT OVC               | 15                  |          |                                             | 168.53                   | 49          | 14  | 05   | 003   |                           |                                     |
| 2205L     | 7500 75 5000 FT OVC               | 4                   |          |                                             | 170.50                   | 49          | 13  | 06   | 003   | 5000                      | 170 / 56                            |
| 2205L     | 22791 82114 74022                 | 17010               | 27321    | 09120                                       | 63161                    | 45343       |     |      |       |                           |                                     |
| 2205L     | 7500 75 5000 FT OVC               | 4                   |          |                                             | 170.48                   | 47          | 22  | 08   | 003   |                           |                                     |
| 2205L     | 7500 75 5000 FT OVC               | 4                   |          |                                             | 165.48                   | 47          | 22  | 06   | 002   |                           |                                     |





## OBSERVATIONS AT 3-HOUR INTERVALS

| TEMPERATURE |       |      |       |      |       |      |       |       |       | TEMPERATURE |       |      |       |       |       |      |       |      |       | TEMPERATURE |       |  |  |  |  |  |  |  |  |
|-------------|-------|------|-------|------|-------|------|-------|-------|-------|-------------|-------|------|-------|-------|-------|------|-------|------|-------|-------------|-------|--|--|--|--|--|--|--|--|
| DATE        |       | TIME |       | WIND |       | TEMP |       | HUMID |       | WIND        |       | TEMP |       | HUMID |       | WIND |       | TEMP |       | HUMID       |       |  |  |  |  |  |  |  |  |
| DAY         | NIGHT | DAY  | NIGHT | DAY  | NIGHT | DAY  | NIGHT | DAY   | NIGHT | DAY         | NIGHT | DAY  | NIGHT | DAY   | NIGHT | DAY  | NIGHT | DAY  | NIGHT | DAY         | NIGHT |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 23          | 24    | 25   | 26    | 27   | 28    | 29   | 30    | 31    | 1     | 2           | 3     | 4    | 5     | 6     | 7     | 8    | 9     | 10   | 11    | 12          | 13    |  |  |  |  |  |  |  |  |
| 14          | 15    | 16   | 17    | 18   | 19    | 20   | 21    | 22    | 23    | 24          | 25    | 26   | 27    | 28    | 29    | 30   | 31    | 1    | 2     | 3           | 4     |  |  |  |  |  |  |  |  |
| 5           | 6     | 7    | 8     | 9    | 10    | 11   | 12    | 13    | 14    | 15          | 16    | 17   | 18    | 19    | 20    | 21   | 22    | 23   | 24    | 25          | 26    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1           | 2     | 3    | 4     | 5    | 6     | 7    | 8     | 9     | 10    | 11          | 12    | 13   | 14    | 15    | 16    | 17   | 18    | 19   | 20    | 21          | 22    |  |  |  |  |  |  |  |  |
| 1</         |       |      |       |      |       |      |       |       |       |             |       |      |       |       |       |      |       |      |       |             |       |  |  |  |  |  |  |  |  |

40733

CEILING  
ONLY INDICATES AIRPOT

4241-63

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1 TORNADO
2 HUMORS:FORM
3 SQUALL
4 RAIN
5 RAIN SHOWERS
6 FREEZING RAIN
7 DRIZZLE
8 FREEZING DRIZZLE
9 SNOW
10 SNOW PELLETS
11 ICE CRYSTALS
12 SNOW SHOWERS
13 SNOW SPAINS
14 ICE PELLETS
15 HAIL
16 FOG
17 ICE FOG
18 GROUND FOG
19 BLOWING DUST
20 BLOWING SAND
21 BLOWING SNOW
22 BLOWING SPRAY
23 SMOKE
24 HAZE
25 FOG

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440

DIRECTIONS ARE THOSE FROM WHICH THE WIND BLOWS. NOTATED IN TENS OF DEGREES FROM TRUE NORTH: 10, 20 FOR EAST, 3 FOR SOUTH, 27 FOR WEST. ENTRY OF 00 IN THE DIRECTION COLUMN INDICATES CALM.

SPEED IS EXPRESSED IN KNOTS.  
MULTIPLY BY 1.85 TO CONVERT  
TO MILES PER HOUR.

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- 512 - CONTINUED

IN JULY 1968, THE TWO STOPS

POSTAGE AND FEES PAID

DEPARTMENT OF COMMERCE



1998

OBSERVATIONS AT 3-0.5 INTERVALS

| TEMPERATURE |     |      |      |             |      |      |      |          |      | TEMPERATURE |     |      |      |             |      |      |      |          |      |
|-------------|-----|------|------|-------------|------|------|------|----------|------|-------------|-----|------|------|-------------|------|------|------|----------|------|
| HOUR        |     | DATE |      | TEMPERATURE |      | WIND |      | MOISTURE |      | HOUR        |     | DATE |      | TEMPERATURE |      | WIND |      | MOISTURE |      |
| TIME        | DAY | TEMP | WIND | TEMP        | WIND | TEMP | WIND | TEMP     | WIND | TIME        | DAY | TEMP | WIND | TEMP        | WIND | TEMP | WIND | TEMP     | WIND |
| 11          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 12          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 13          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 14          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 15          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 16          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 17          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 18          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 19          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 20          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 22          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 23          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 24          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 25          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 26          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 27          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 28          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 29          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 30          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 31          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 32          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   |
| 33          | 21  | 31   | 31   | 37          | 37   | 36   | 36   | 31       | 31   | 21          | 21  |      |      |             |      |      |      |          |      |

NOTES  
 1. NO  
 2. NO

204-53

1 THUNDER  
 2 THUNDER-THUNDER  
 3 SQUALL  
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 5 RAIN SHOWERS  
 6 PRECIPITATING RAIN  
 7 CRISTINE  
 8 PRECIPITATING CRISTINE  
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APPENDIX G  
WIND, SEA AND SWELL OBSERVATIONS FROM  
LIGHTSHIP *COLUMBIA* AT APPROXIMATE TIMES OF BAR TRANSITS  
(PHASE I ONLY)

SOURCE: S. Noble, U.S. Army Engineer District,  
Portland, Personal Communication

SUMMARY OF WAVE SPECTRA AND WIND DATA AND PLOTS OF  
WAVE SPECTRA CORRESPONDING TO APPROXIMATE TIMES  
OF BAR TRANSITS  
(PHASE II AND SELECTED VOYAGES OF PHASE I)

SOURCE: Dr. Lee Harris, U.S. Army Coastal Engineering  
and Research Center

Note: All wave spectra data is to be considered preliminary. Wave spectra data for Voyage Nos. 20, 21, 22, 30, and 31 are from a Waverider buoy which was implanted by the Portland District Army Corps of Engineers near the lightship *Columbia*. Wave spectra data for the remaining voyages are from the NOAA wave gauge located in the navigational lightbuoy which replaced the lightship *Columbia*.

WIND, SEA AND SWELL OBSERVATIONS  
FROM LIGHTSHIP COLUMBIA  
AT APPROXIMATE TIMES OF BAR TRANSITS

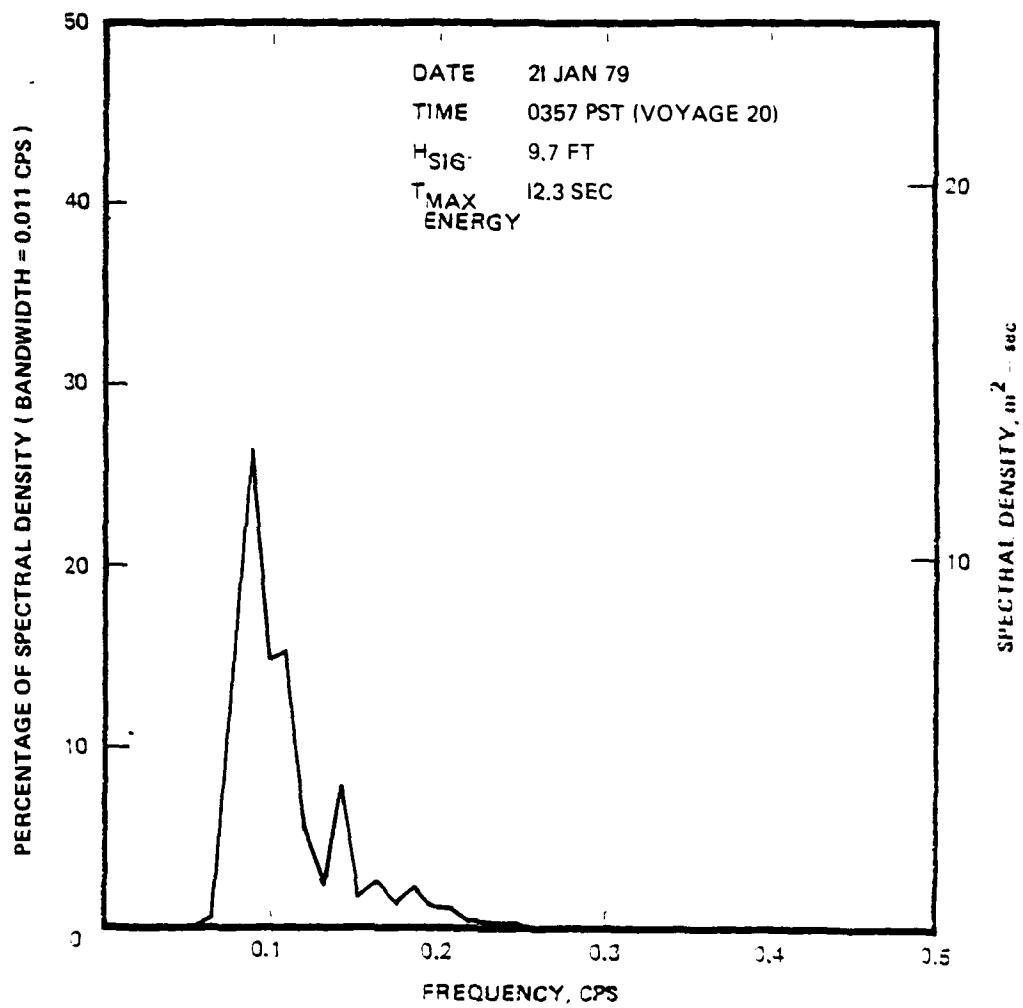
| CORRESPONDING<br>VOYAGE<br>NUMBER | DATE      | TIME<br>(PST) | WIND              |                  | SEA                                |                 | SWELL             |                                    |                 |
|-----------------------------------|-----------|---------------|-------------------|------------------|------------------------------------|-----------------|-------------------|------------------------------------|-----------------|
|                                   |           |               | DIRECTION<br>(°T) | SPEED<br>(knots) | HEIGHT<br>( $\frac{1}{2}$ -meters) | PERIOD<br>(sec) | DIRECTION<br>(°T) | HEIGHT<br>( $\frac{1}{2}$ -meters) | PERIOD<br>(sec) |
| 8                                 | 1 Nov 78  | 1300          | 310               | 22               | 1                                  | 2               | 270               | 3                                  | 6               |
| 9                                 | 4 Nov 78  | 1000          | 50                | 10               | 0                                  | 0               | 270               | 3                                  | 6               |
| 10                                | 9 Nov 78  | 0400          | 40                | 15               | 0                                  | 0               | 270               | 3                                  | 6               |
| 10                                | 9 Nov 78  | 0700          | 50                | 20               | 1                                  | 2               | 270               | 3                                  | 6               |
| 11                                | 10 Nov 78 | 1300          | 360               | 22               | 1                                  | 2               | 270               | 3                                  | 6               |
| 11                                | 10 Nov 78 | 1600          | 60                | 16               | 1                                  | 2               | 270               | 2                                  | 6               |
| 12                                | 28 Nov 78 | 1300          | 180               | 15               | 0                                  | 0               | 240               | 2                                  | 7               |
| 13                                | 3 Dec 78  | 0400          | 190               | 17               | 1                                  | 1               | 270               | 2                                  | 7               |
| 13                                | 3 Dec 78  | 0700          | 180               | 25               | 2                                  | 5               | 240               | 3                                  | 7               |
| 14                                | 4 Dec 78  | 1600          | 340               | 27               | 2                                  | 4               | 290               | 4                                  | 6               |
| 15                                | 15 Dec 78 | 0400          | 270               | 11               | 0                                  | 0               | 270               | 5                                  | 6               |
| 15                                | 15 Dec 78 | 0700          | 260               | 9                | 0                                  | 0               | 270               | 5                                  | 6               |
| 16                                | 17 Dec 78 | 1300          | 160               | 12               | 2                                  | 3               | 270               | 6                                  | 7               |
| 16                                | 17 Dec 78 | 1600          | 140               | 5                | 1                                  | 3               | 270               | 5                                  | 7               |
| 17                                | 30 Dec 78 | 0100          | 70                | 16               | 1                                  | 5               | 280               | 2                                  | 7               |
| 18                                |           |               |                   |                  |                                    |                 |                   |                                    |                 |
| 19                                |           |               |                   |                  |                                    |                 |                   |                                    |                 |
| 20                                |           |               | ---NO DATA---     |                  |                                    |                 |                   |                                    |                 |
| 21                                | 24 Jan 79 | 0700          | 90                | 12               | 0                                  | 0               | 270               | 2                                  | 7               |
| 22                                | 28 Jan 79 | 0400          | 60                | 15               | 0                                  | 0               | 300               | 4                                  | 6               |
| 22                                | 28 Jan 79 | 0700          | 50                | 12               | 0                                  | 0               | 280               | 3                                  | 5               |
| 23                                | 7 Feb 79  | 2200          | 160               | 12               | 0                                  | 0               | 250               | 3                                  | 6               |
| 23                                | 8 Feb 79  | 0100          | 150               | 13               | 1                                  | 4               | 250               | 3                                  | 6               |
| 24                                | 11 Feb 79 | 1000          | 180               | 18               | 1                                  | N/A             | 230               | 3                                  | 7               |
| 25                                | 22 Feb 79 | 2200          | 80                | 16               | 1                                  | 3               | 280               | 2                                  | 6               |
| 26                                | 27 Feb 79 | 1300          | 220               | 9                | 0                                  | 0               | 240               | 3                                  | 6               |
| 27                                |           |               | ---NO DATA---     |                  |                                    |                 |                   |                                    |                 |
| 28                                | 22 Mar 79 | 0400          | 90                | 9                | 0                                  | 0               | 300               | 2                                  | 7               |
| 29                                | 23 Mar 79 | 0700          | 70                | 10               | 0                                  | 0               | 330               | 2                                  | 7               |
| 29                                | 23 Mar 79 | 1000          | 10                | 8                | 0                                  | 0               | 300               | 2                                  | 7               |

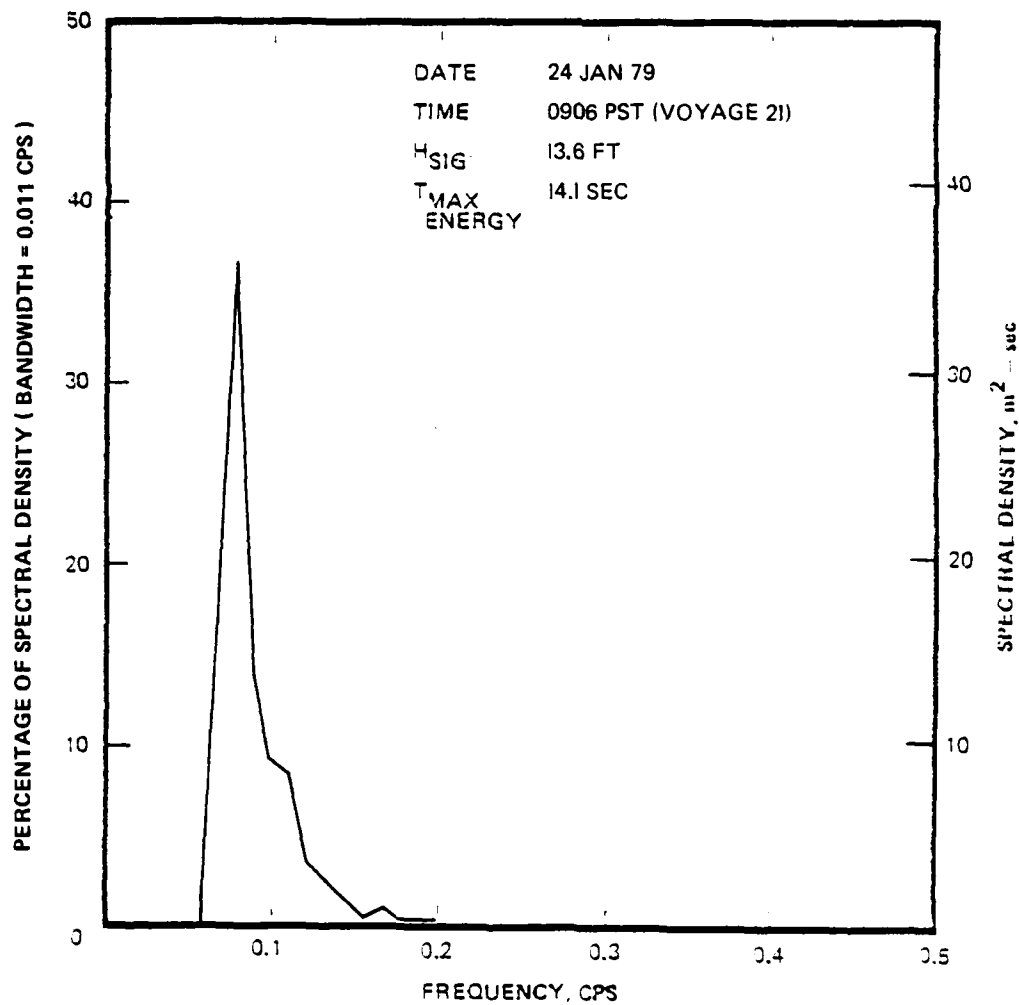
# SUMMARY OF WAVE SPECTRA AND WIND DATA

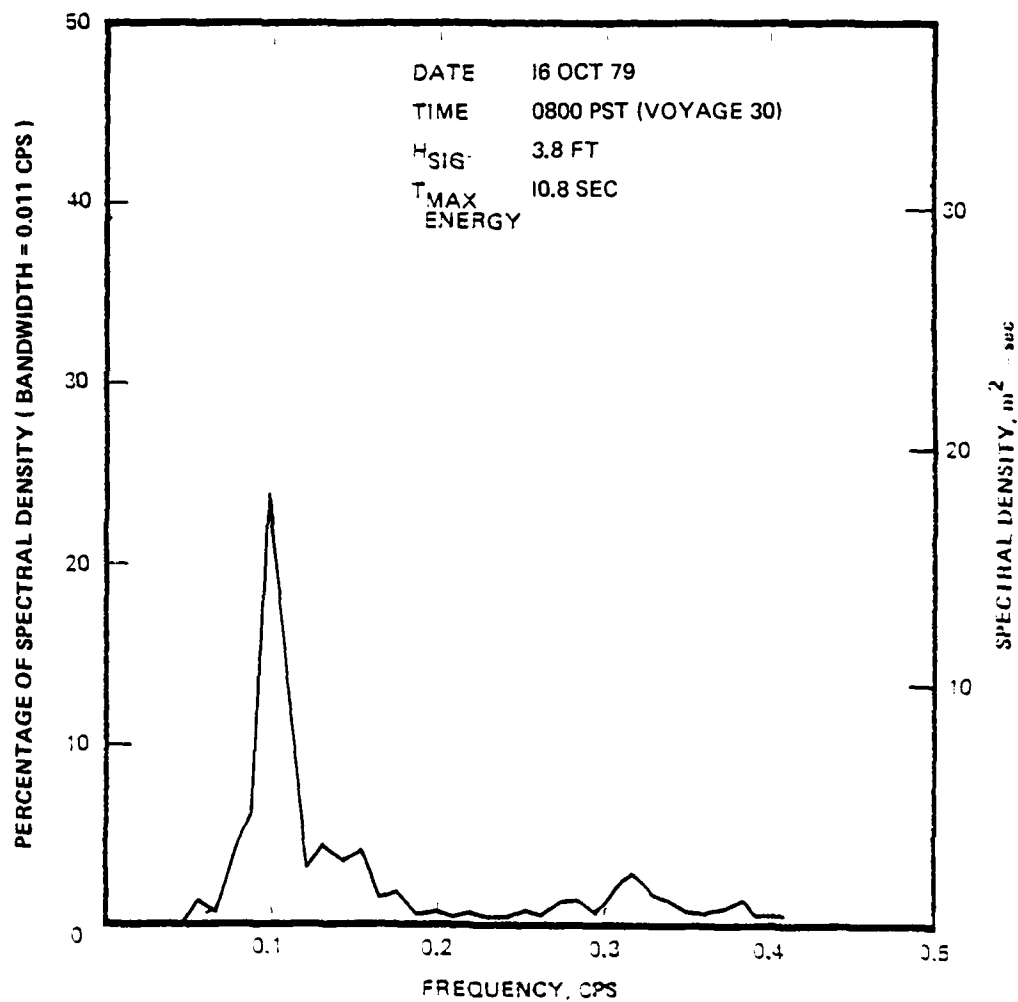
| CORRESPONDING<br>VOYAGE NUMBER | DATE      | TIME<br>(PST) | WIND             |                   | WAVE SPECTRA DATA             |                 |
|--------------------------------|-----------|---------------|------------------|-------------------|-------------------------------|-----------------|
|                                |           |               | SPEED<br>(KNOTS) | DIRECTION<br>(°T) | SIGNIFICANT<br>HEIGHT<br>(FT) | PERIOD<br>(SEC) |
| 20                             | 21 JAN 79 | 0357          | --               | --                | 9.7                           | 12.3            |
| 21                             | 24 JAN 79 | 0906          | --               | --                | 13.6                          | 14.1            |
| 22                             | 28 JAN 79 | 0654          | --               | --                | 10.1                          | 10.8            |
| 30                             | 16 OCT 79 | 0800          | --               | --                | 3.8                           | 10.8            |
| 31                             | 17 OCT 79 | 1700          | --               | --                | 9.0                           | 14.1            |
| 32                             | --        | --            | --               | --                | --                            | --              |
| 33                             | 14 NOV 79 | 2000          | --               | --                | 3.9                           | 8.3             |
| 34                             | 17 NOV 79 | 2300          | --               | --                | 7.2                           | 9.1             |
| 35                             | 21 NOV 79 | 0500          | --               | --                | 9.8                           | 12.5            |
| 36                             | 26 NOV 79 | 0900          | --               | --                | 7.4                           | 8.3             |
| 37                             | 28 NOV 79 | 2100          | --               | --                | 7.8                           | 12.5            |
| 38                             | 03 DEC 79 | 1400          | --               | --                | 12.6                          | 7.7             |
| 39                             | 16 DEC 79 | 0800          | --               | --                | 4.3                           | 9.1             |
| 40                             | 18 DEC 79 | 0900          | --               | --                | 12.9                          | 11.1            |
| 41                             | 20 JAN 80 | 1200          | 6.7              | 100.6             | 4.0                           | 16.7            |
| 42                             | 24 JAN 80 | 0800          | 0.2              | 321.0             | 5.3                           | 11.1            |
| 43                             | 04 FEB 80 | 1400          | 5.8              | 73.2              | 7.5                           | 12.5            |
| 44                             | 06 FEB 80 | 1300          | 11.6             | 267.5             | 14.3                          | 11.1            |
| 45                             | 10 FEB 80 | 0500          | 8.0              | 99.1              | 5.5                           | 12.5            |
| 46                             | --        | --            | --               | --                | --                            | --              |
| 47                             | 04 MAR 80 | 1800          | 6.2              | 173.9             | 6.3                           | 14.4            |
| 48                             | 10 MAR 80 | 2100          | 8.1              | 317.8             | 7.9                           | 6.3             |
| 49                             | 18 MAR 80 | 2300          | 5.1              | 278.4             | 9.6                           | 12.5            |
| 50                             | 22 MAR 80 | 1300          | 7.3              | 241.8             | 8.0                           | 14.3            |
| 51                             | 26 MAR 80 | 1000          | 9.8              | 295.2             | 9.9                           | 14.3            |
| 52                             | --        | --            | --               | --                | --                            | --              |
| 53                             | --        | --            | --               | --                | --                            | --              |

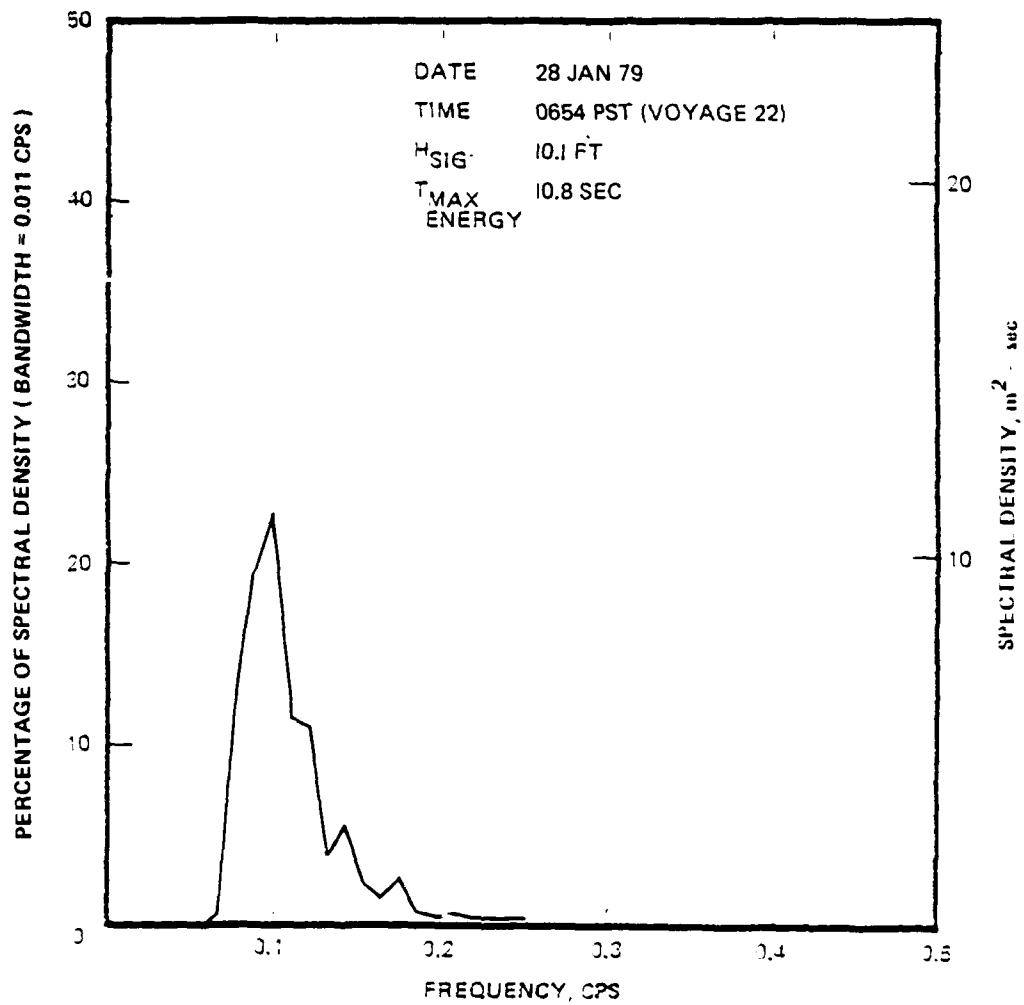
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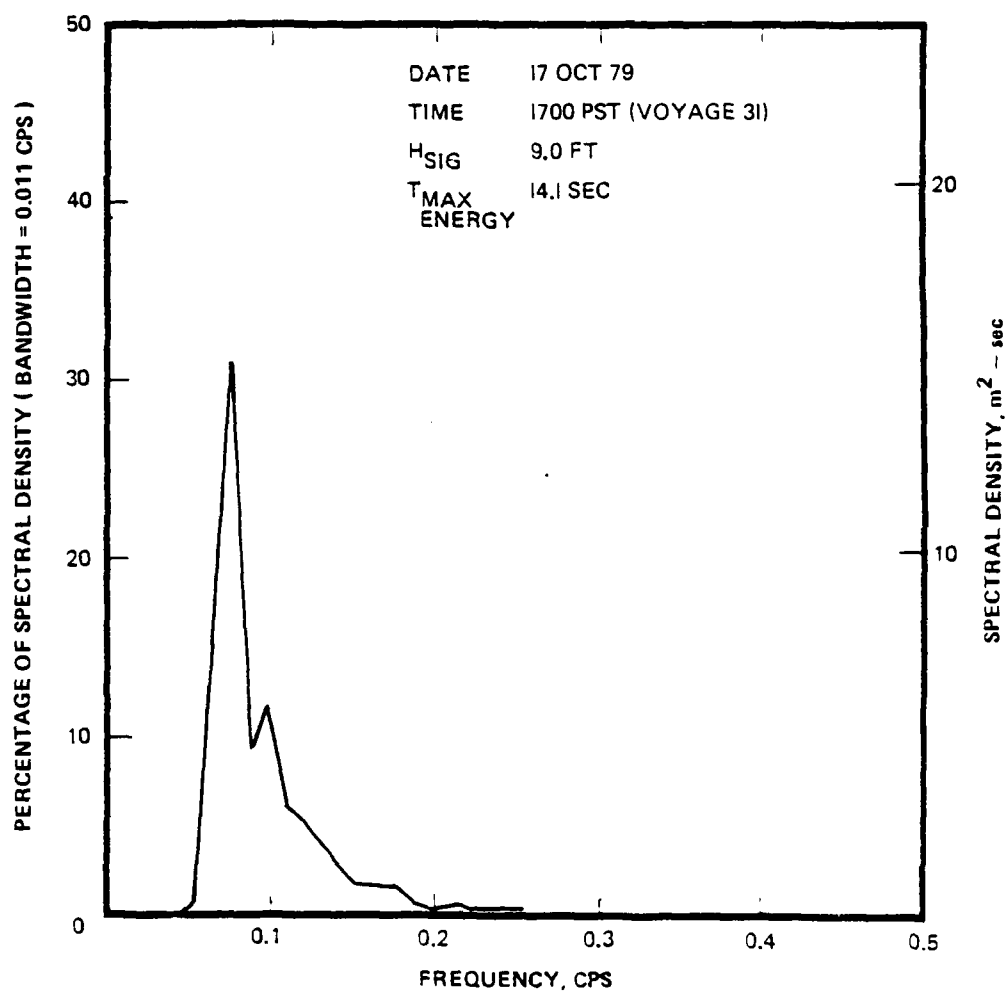


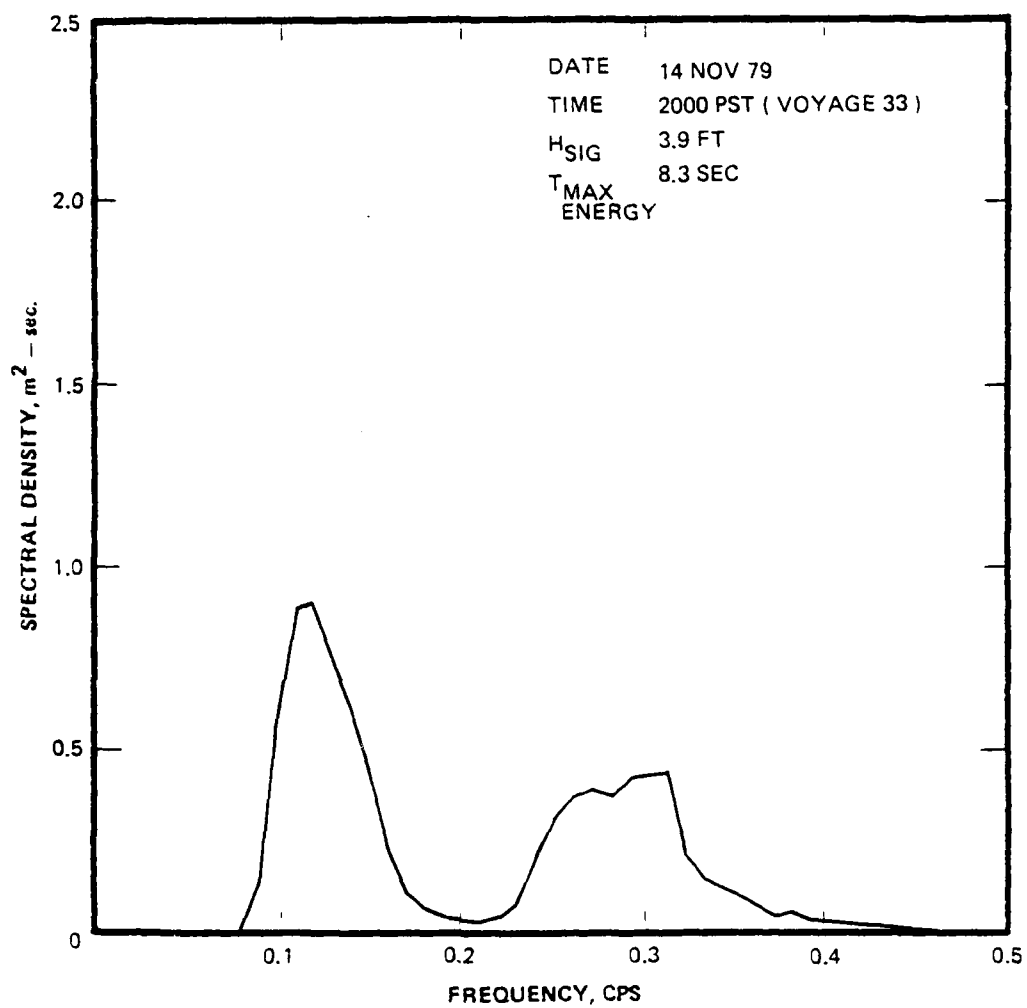


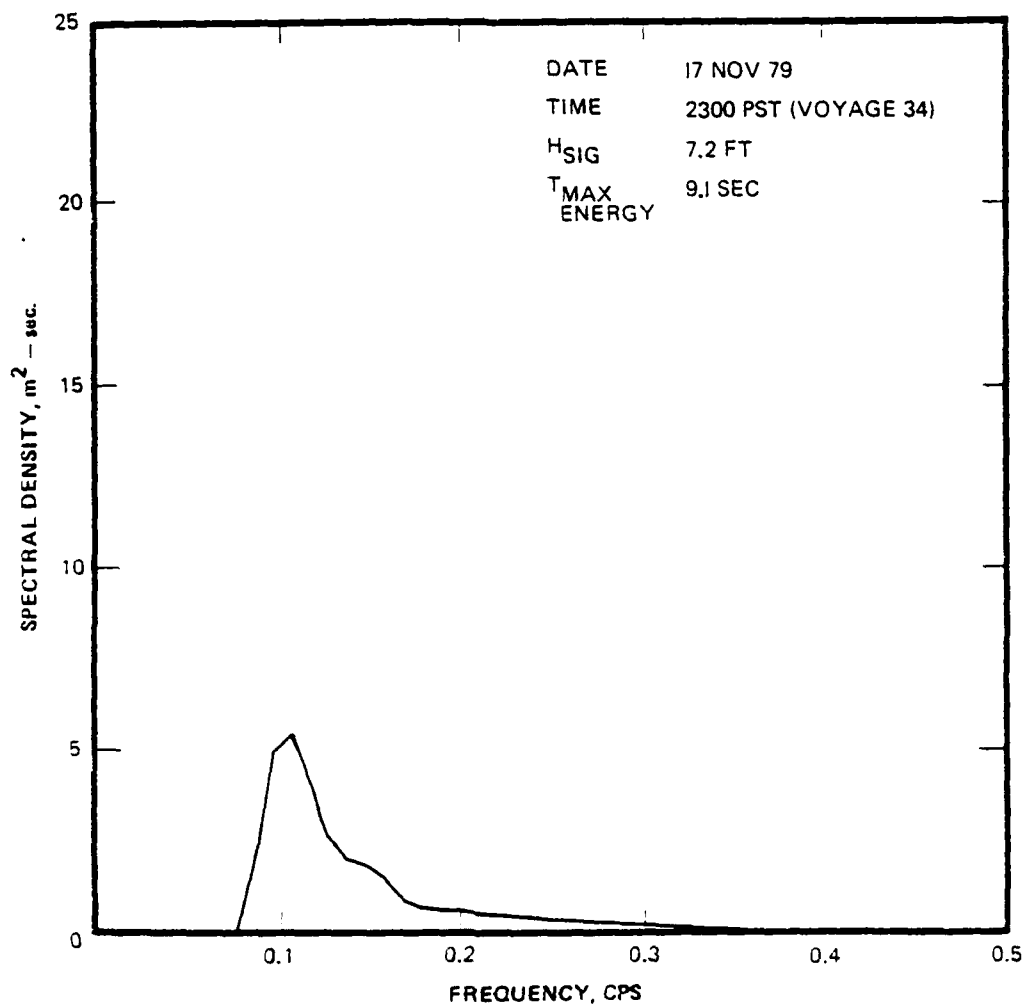


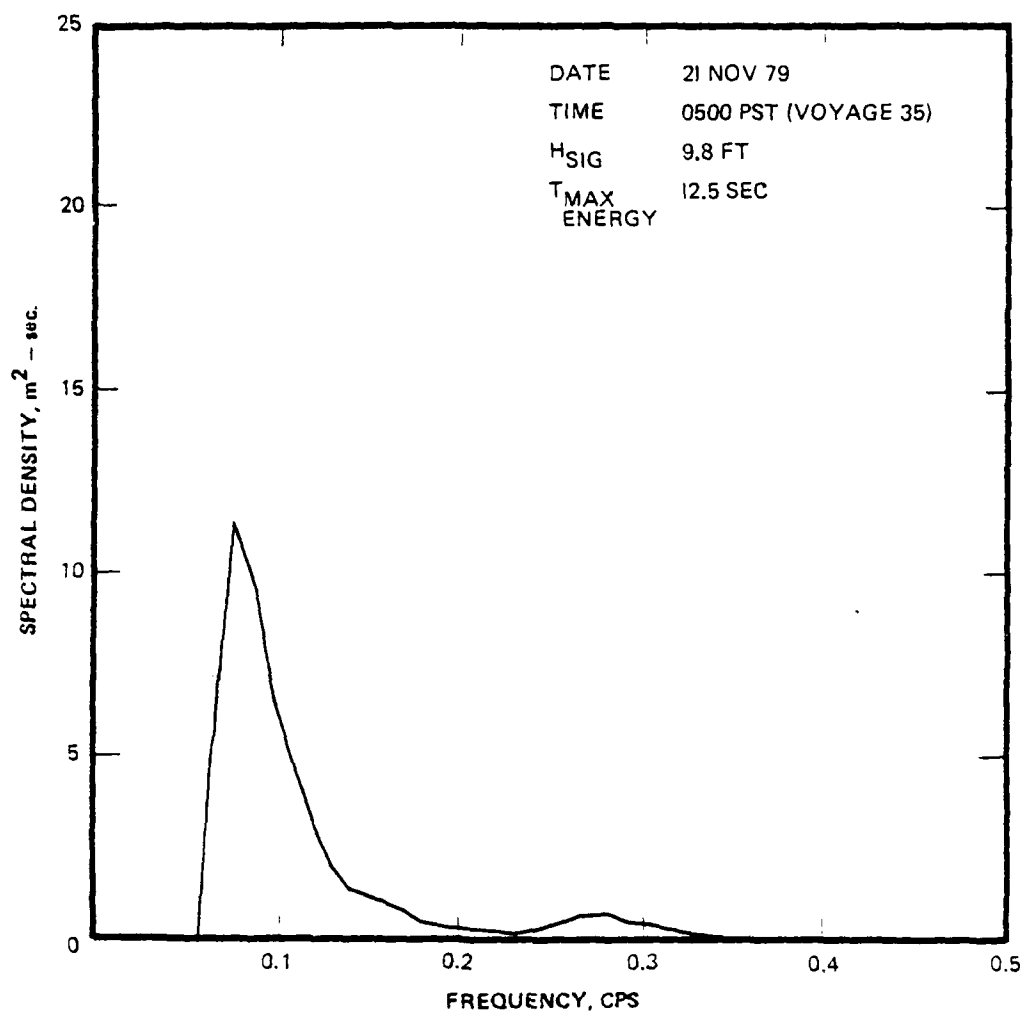




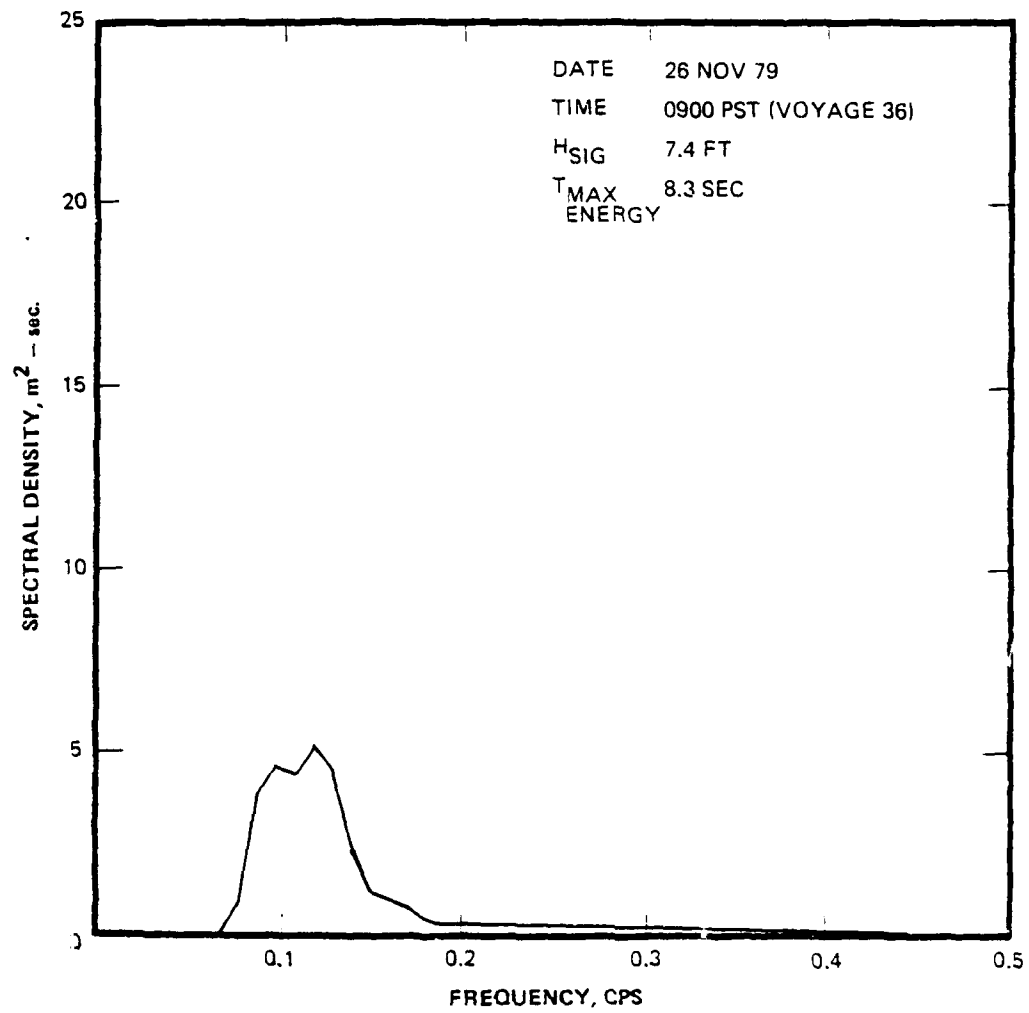












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TETRA TECH INC PASADENA CA

F/G 13/10

COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

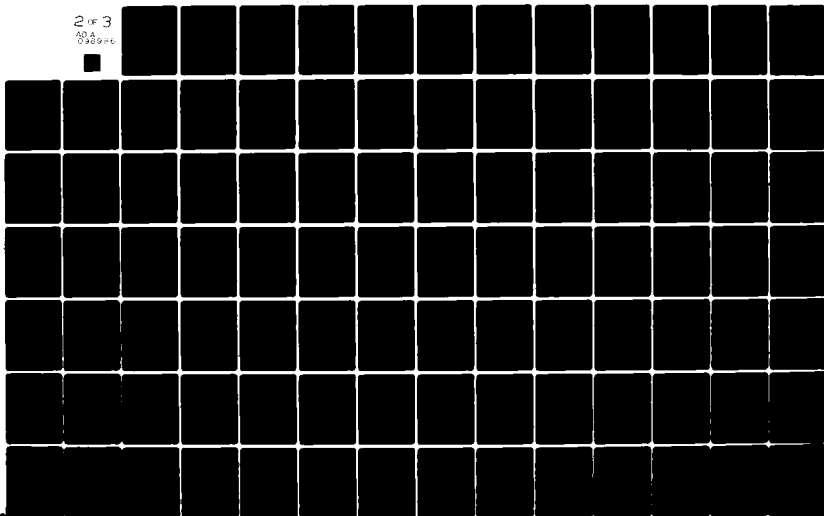
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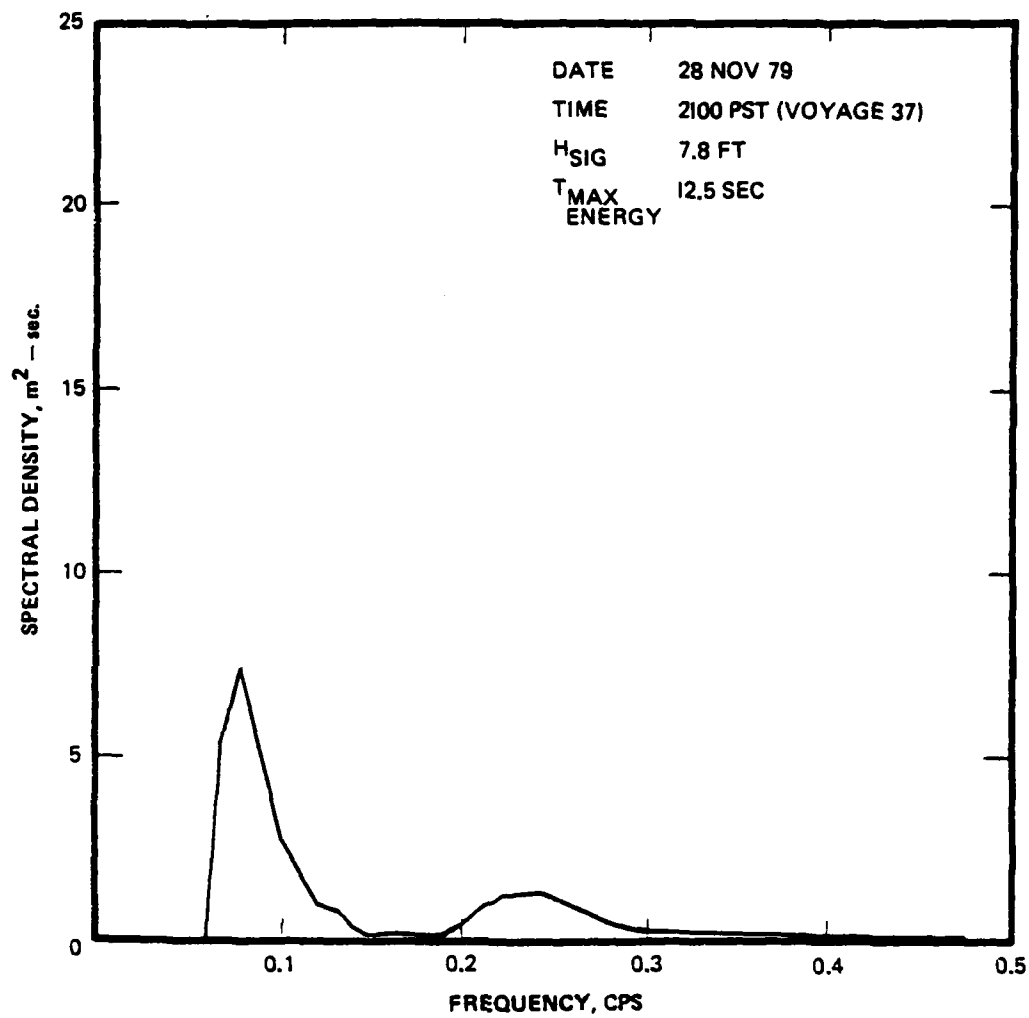
UNCLASSIFIED TETRAT-TC-3925-APP-B-K

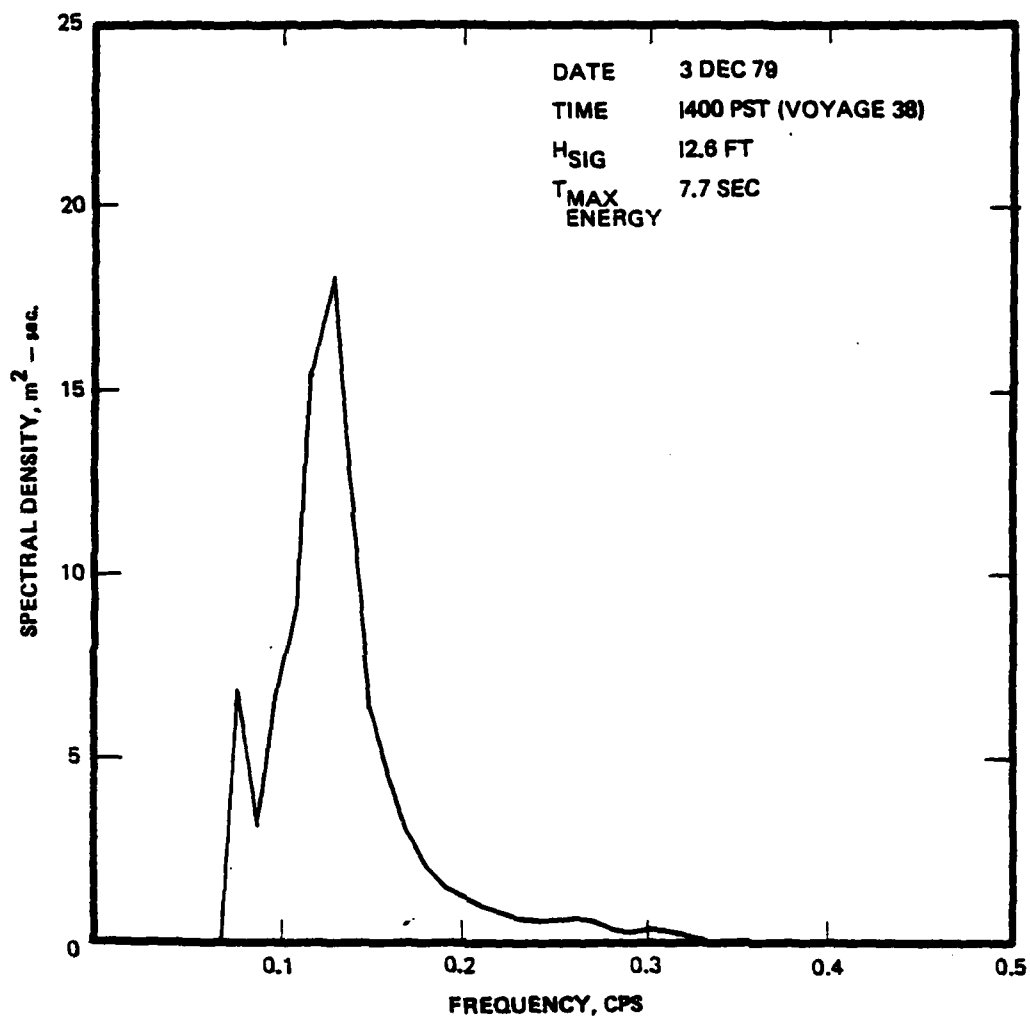
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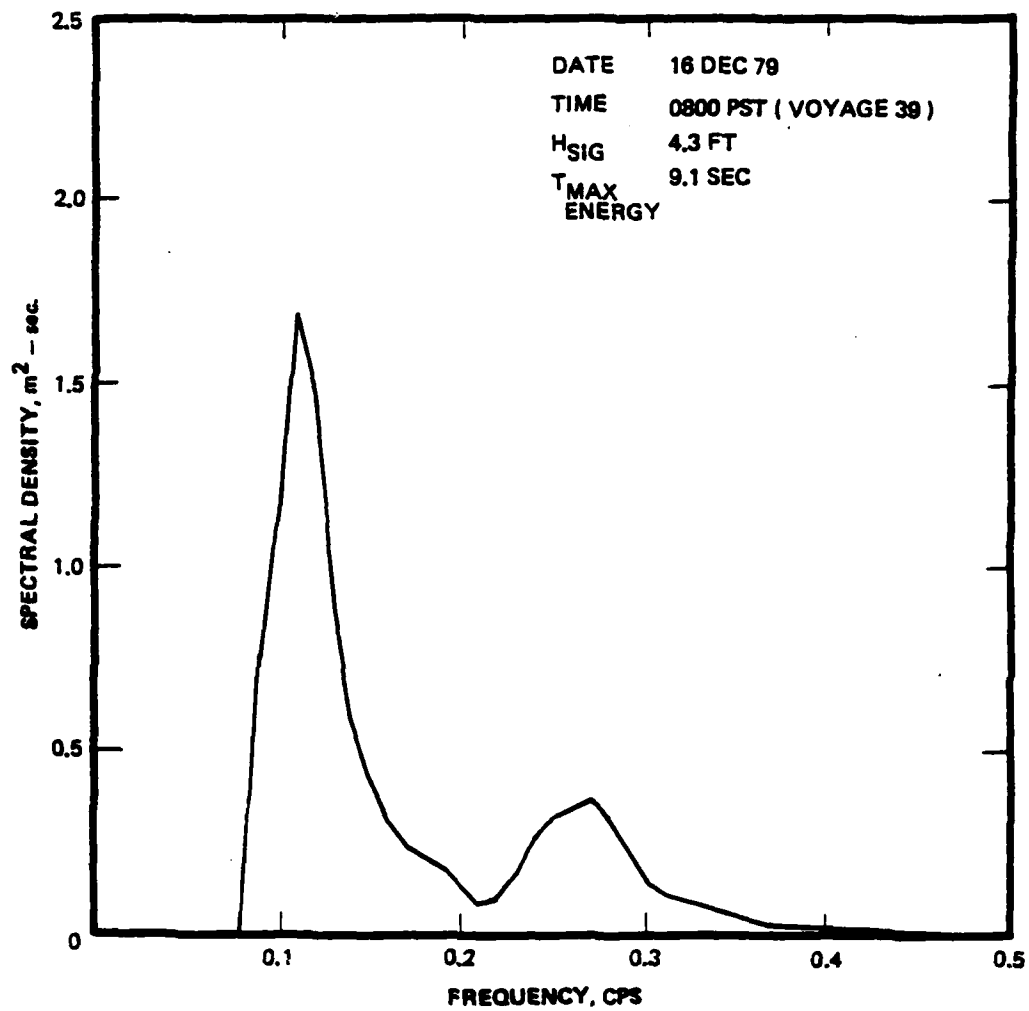
2 of 3

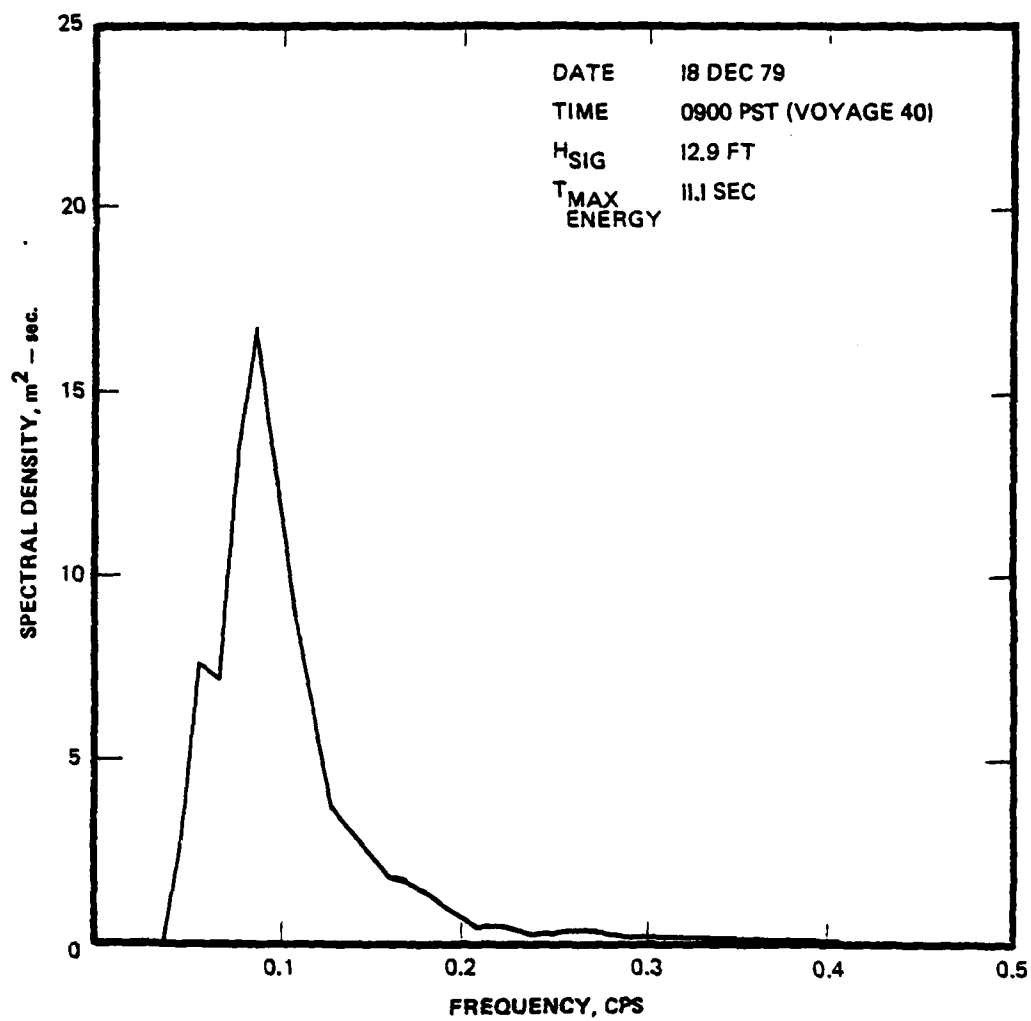
ADA  
098986

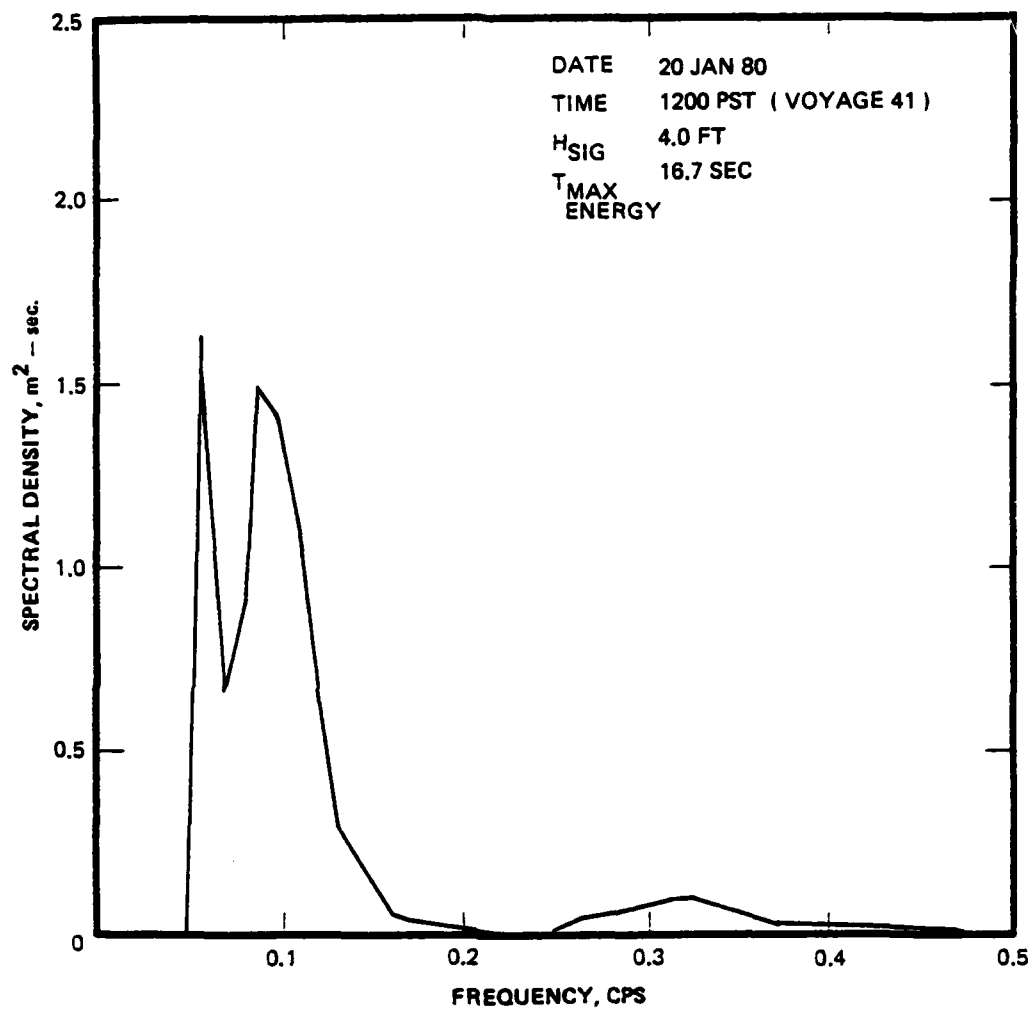


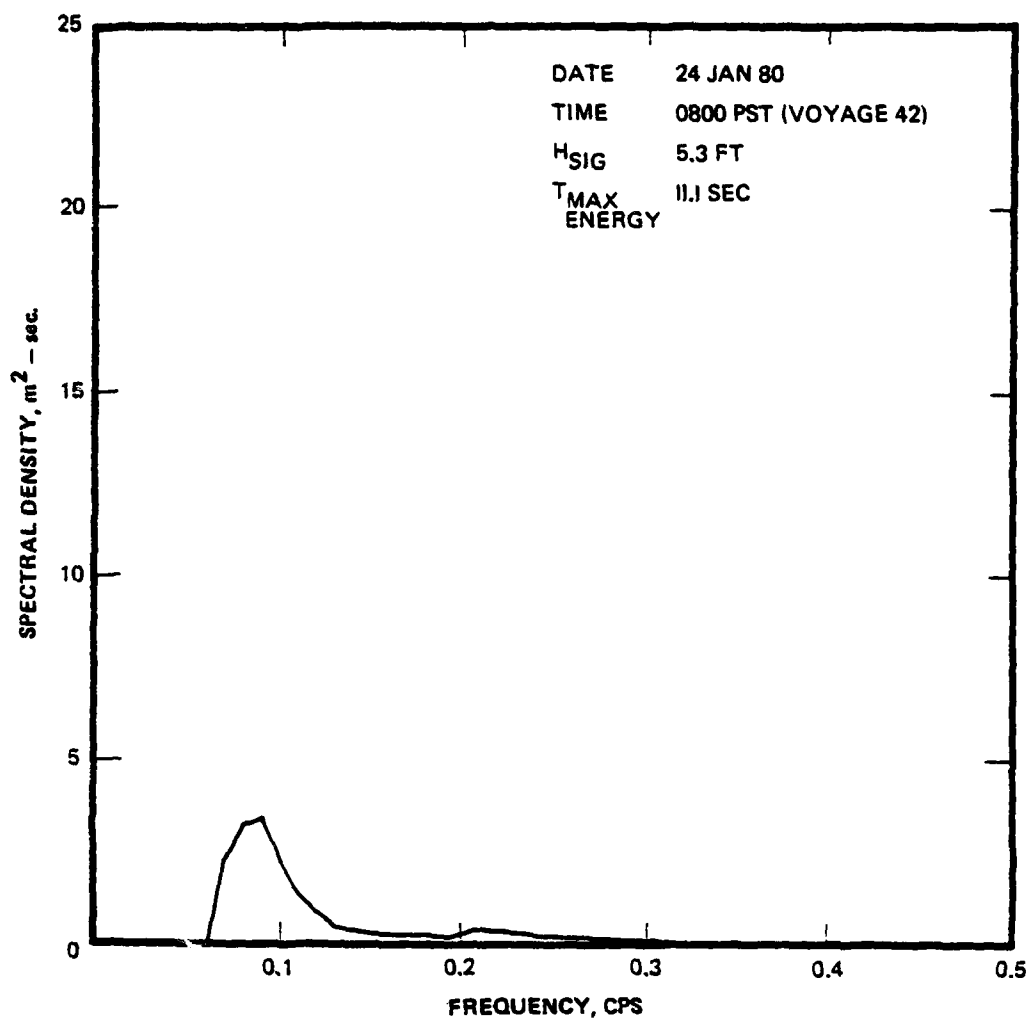




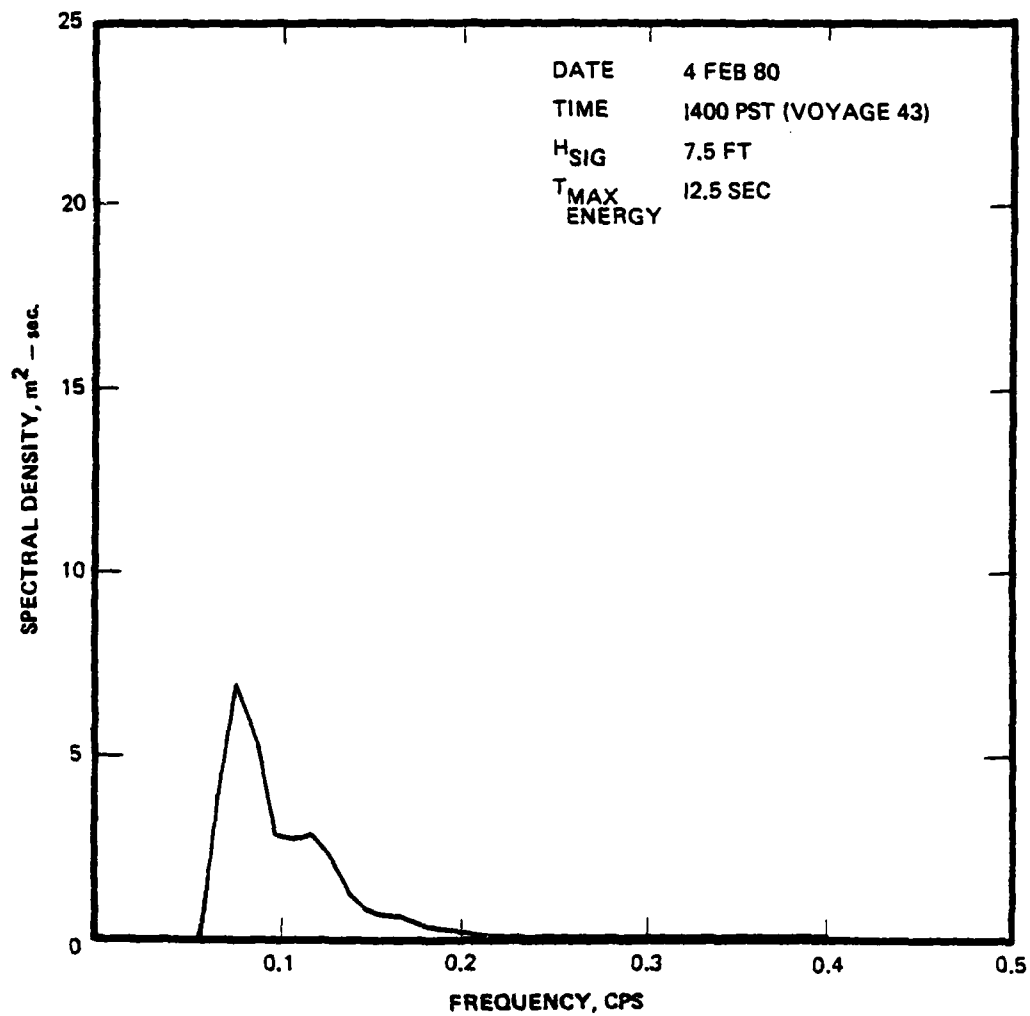


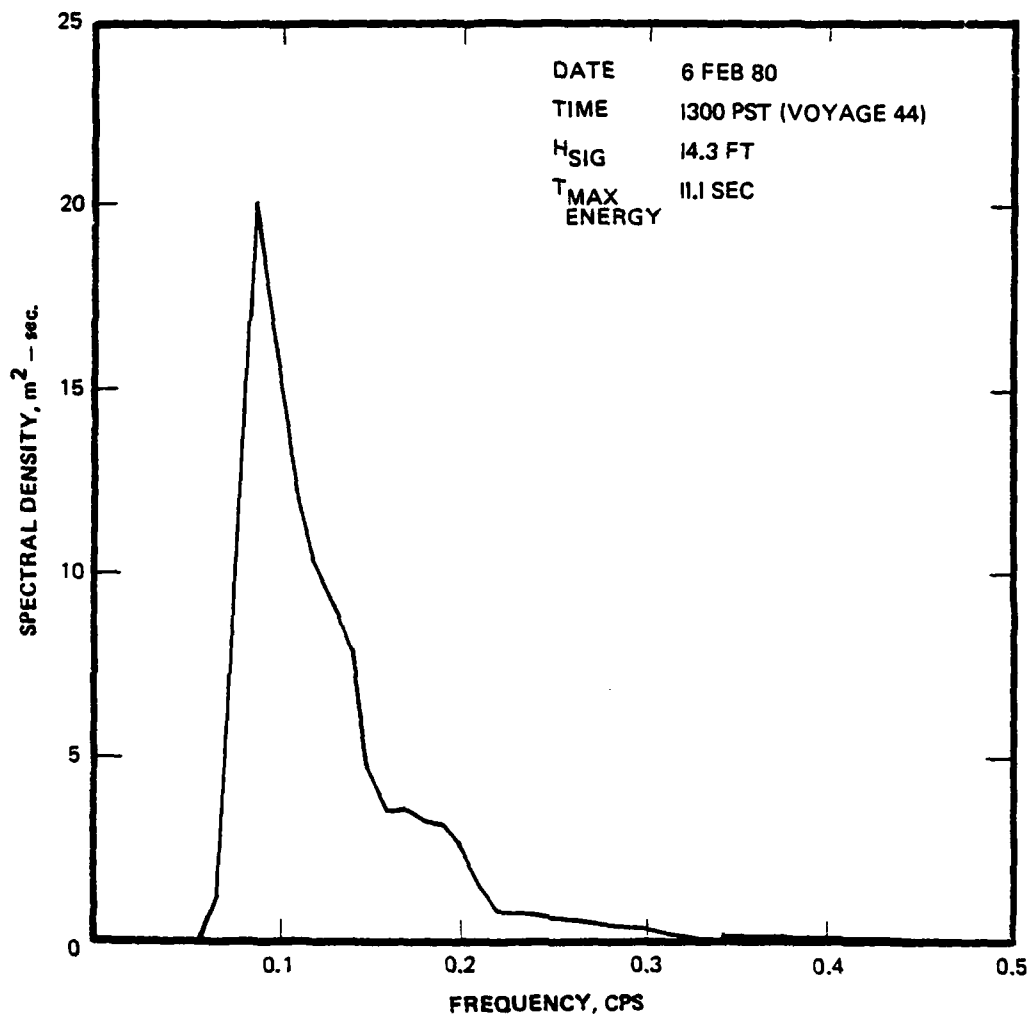


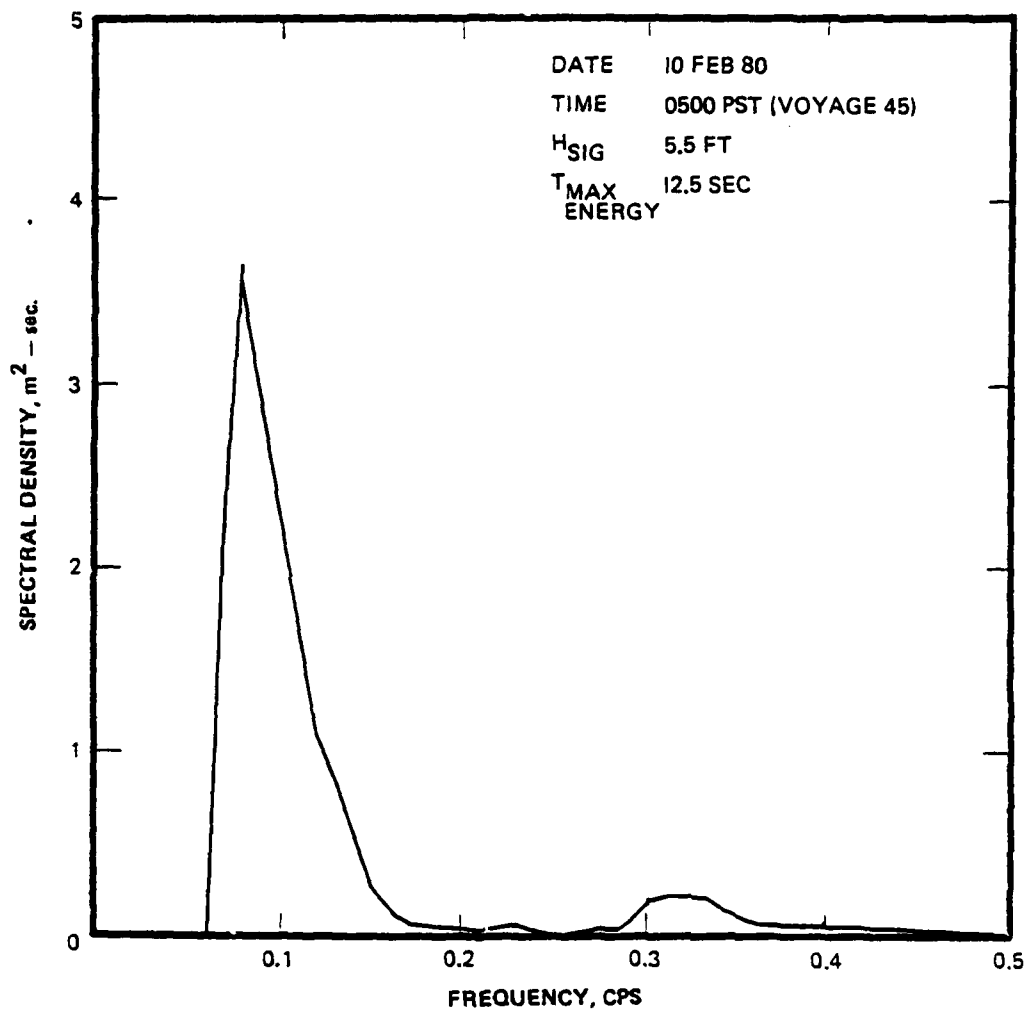


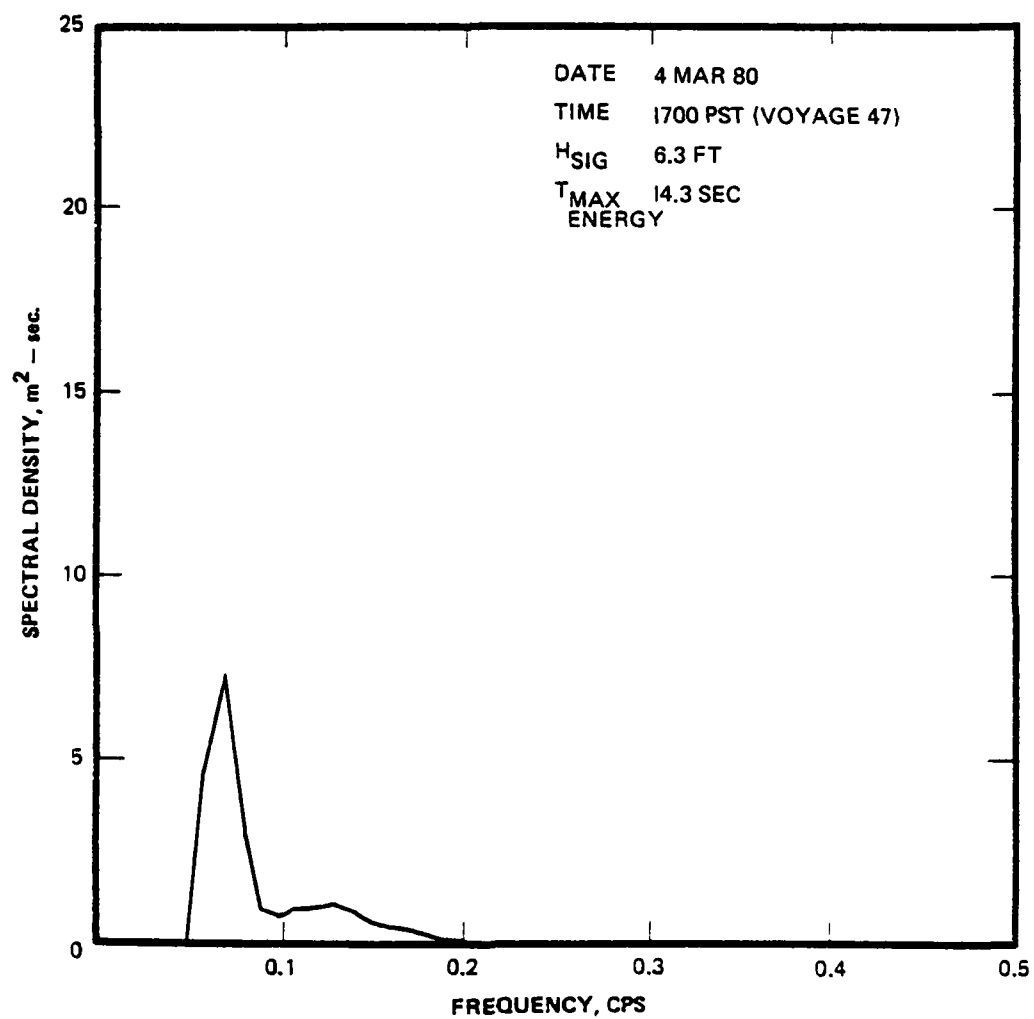


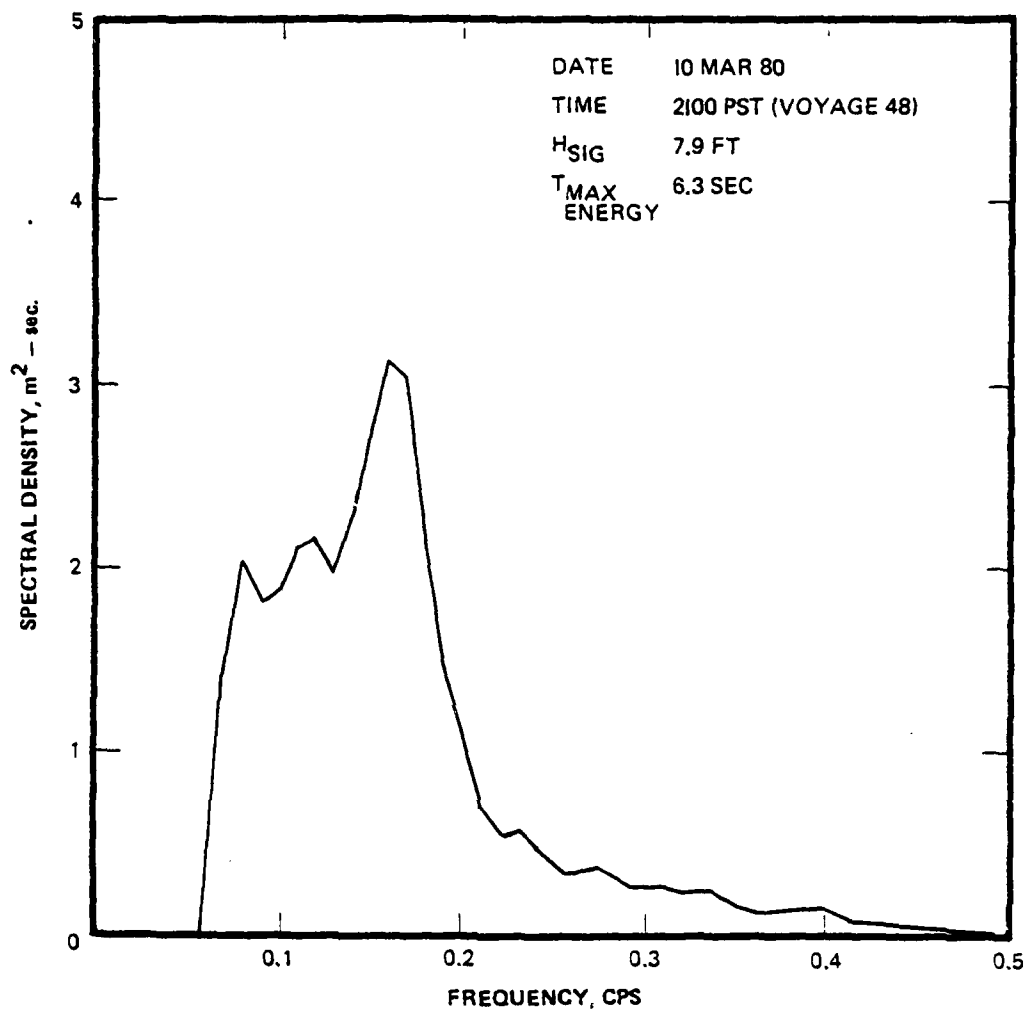


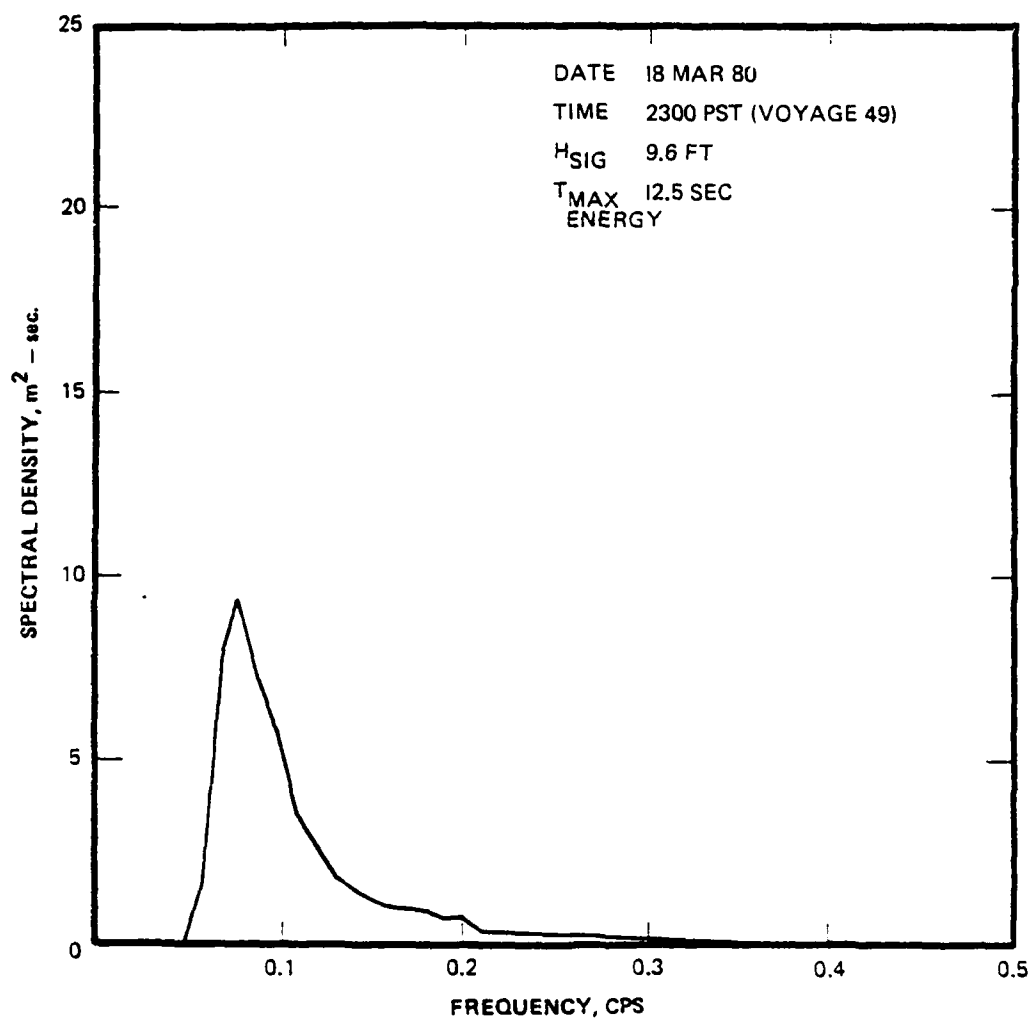


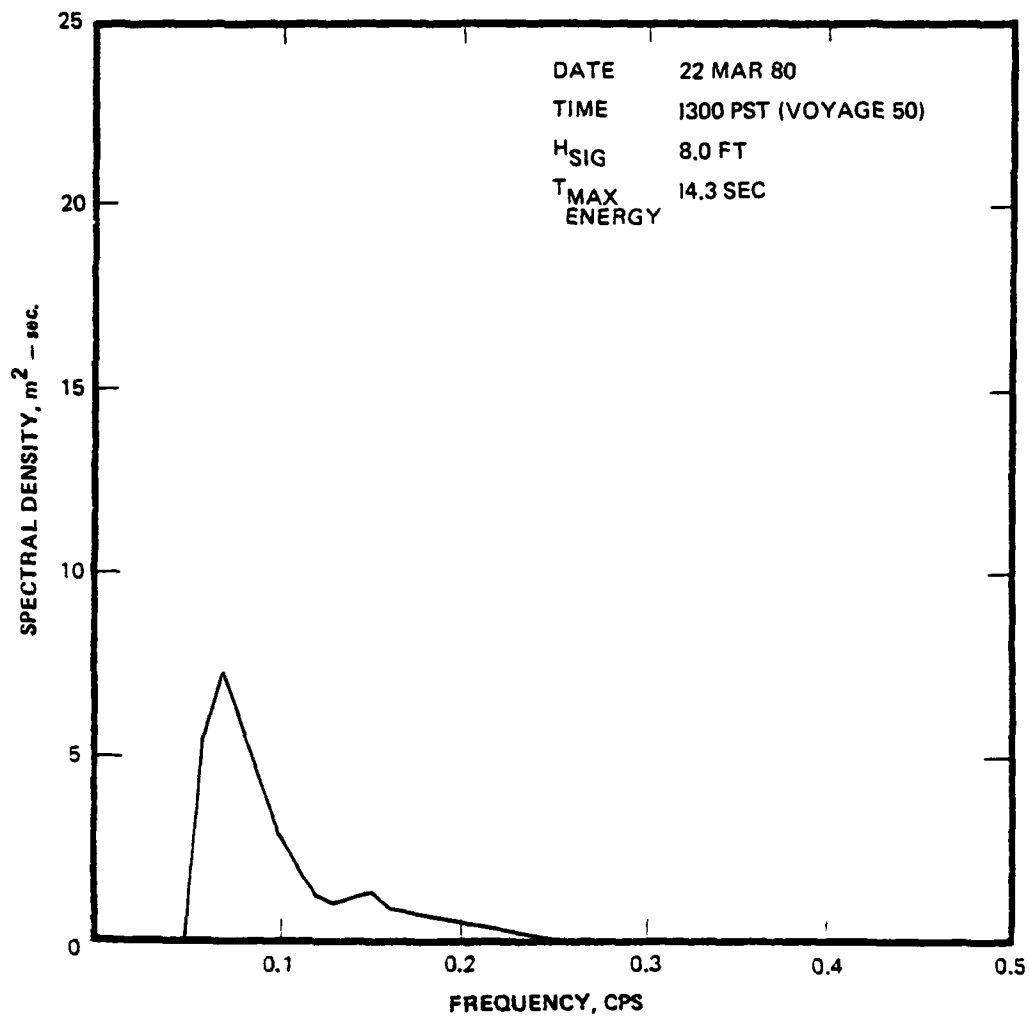


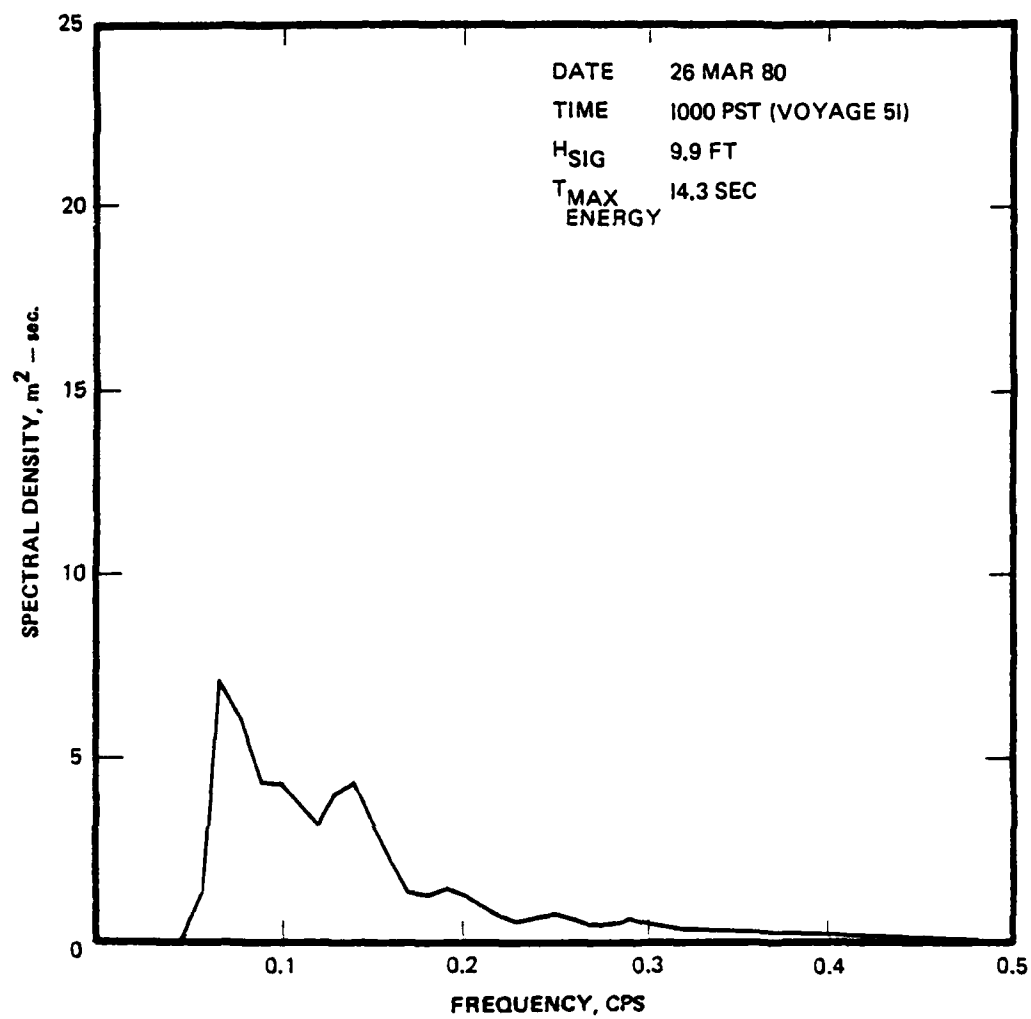














#### APPENDIX H

##### TIDE HYDROGRAPH AND RIVER DISCHARGE FOR EACH BAR CROSSING

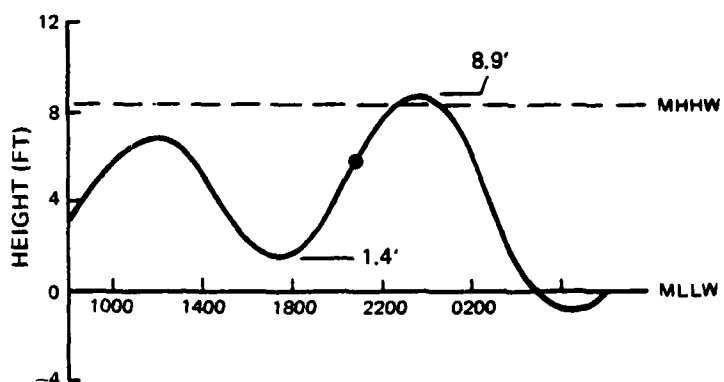
- SOURCES:
1. Observed Tide Heights from National Ocean Survey (NOAA) Gauge at Astoria, Oregon
  2. River Discharge Records for Vancouver, Washington from J.C. Huetter, Acting Chief, Engineering Division, U.S. Army Engineering District, Portland, May 1979, May 1980, Personal Communication.
  3. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, 1980: Tide Tables 1979, High and Low Water Predictions, West Coast of North America and South America.

Note: Observed tide data for April 1980 was unavailable at the time of writing. Therefore, tide hydrographs for Voyage Nos. 52 and 53 are based on predicted tide heights from source [3] cited above.

### VOYAGE NO. 1

TIDE HYDROGRAPH FOR  
20 - 21 MAY 1978

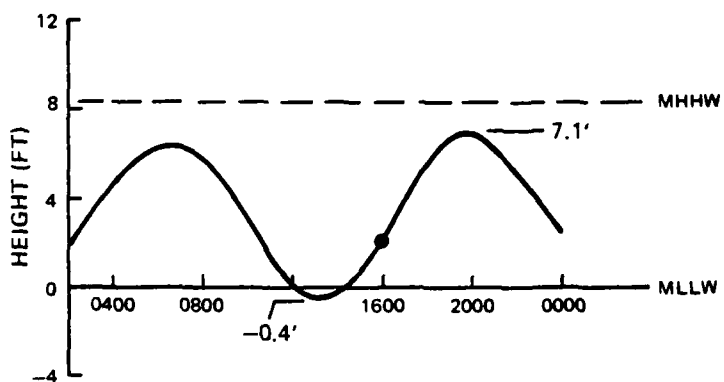
RIVER DISCHARGE = 232,000 CFS



### VOYAGE NO. 2

TIDE HYDROGRAPH FOR  
29 - 30 MAY 1978

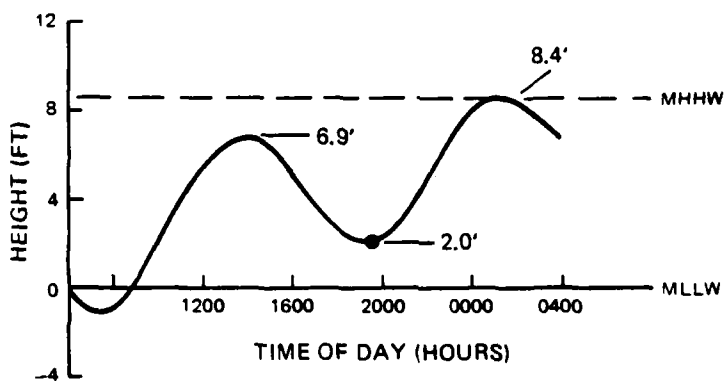
RIVER DISCHARGE = 210,000 CFS



### VOYAGE NO. 3

TIDE HYDROGRAPH FOR  
5 - 6 JUNE 1978

RIVER DISCHARGE = 219,000 CFS

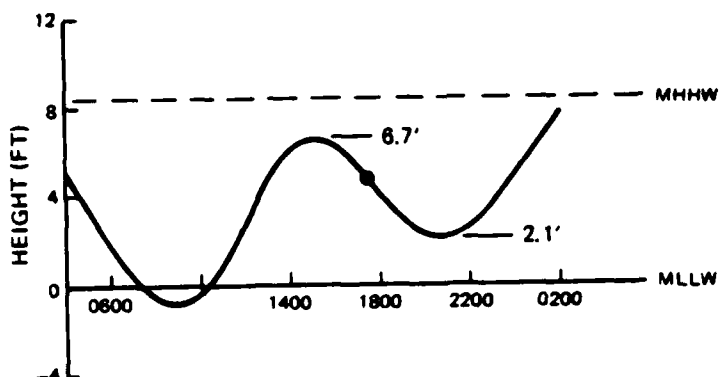


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 4

TIDE HYDROGRAPH FOR  
7 - 8 JUNE 1978

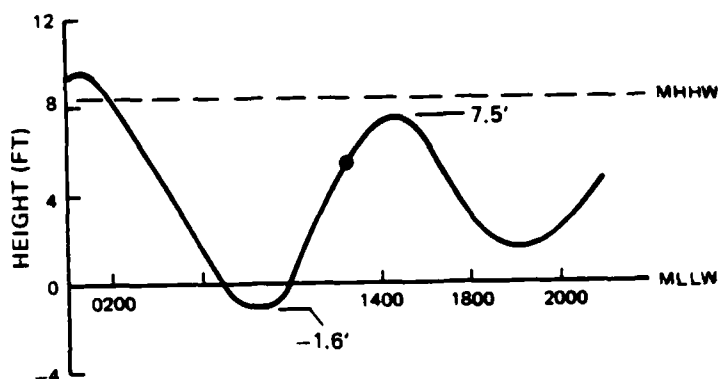
RIVER DISCHARGE = 217,000 CFS



### VOYAGE NO. 5

TIDE HYDROGRAPH FOR  
21 JUNE 1978

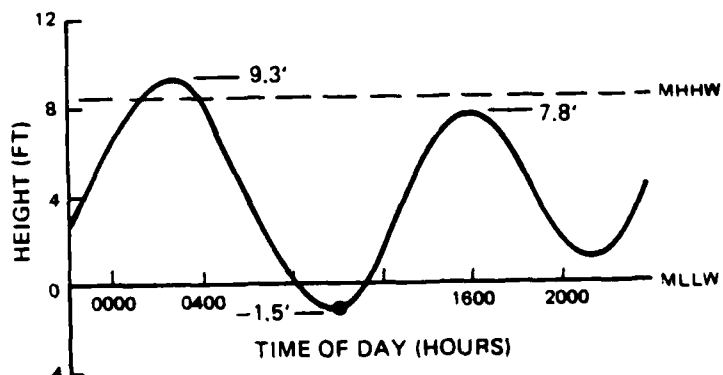
RIVER DISCHARGE = 247,000 CFS



### VOYAGE NO. 6

TIDE HYDROGRAPH FOR  
22 - 23 JUNE 1978

RIVER DISCHARGE = 219,000 CFS

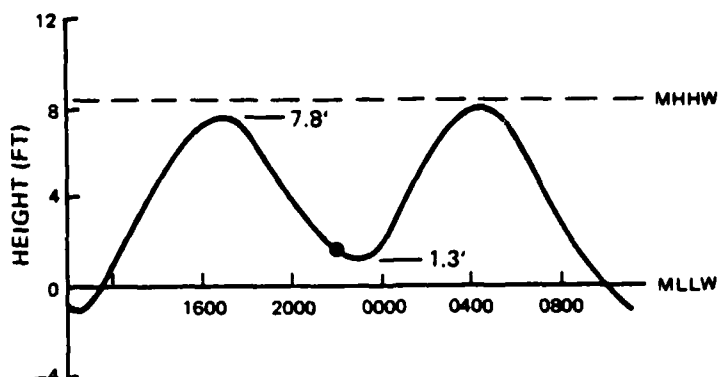


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 7

TIDE HYDROGRAPH FOR  
24 - 25 JUNE 1978

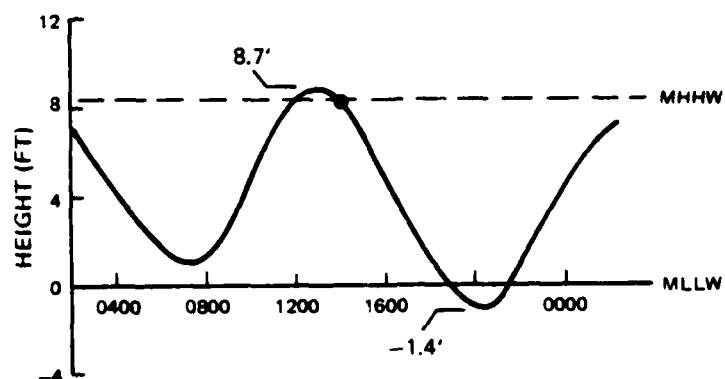
RIVER DISCHARGE = 214,000 CFS



### VOYAGE NO. 8

TIDE HYDROGRAPH FOR  
1 - 2 NOVEMBER

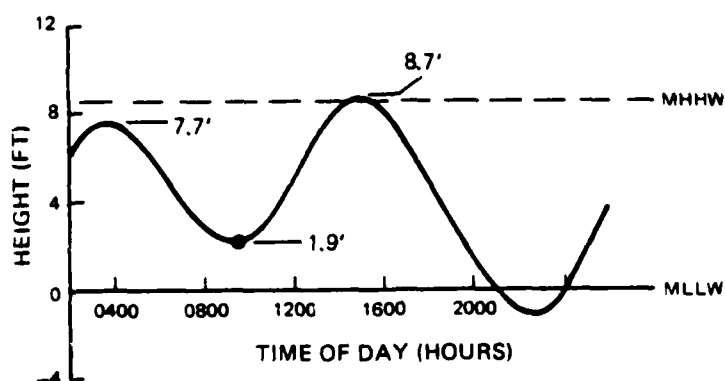
RIVER DISCHARGE = 139,000 CFS



### VOYAGE NO. 9

TIDE HYDROGRAPH FOR  
4 - 5 NOVEMBER 1978

RIVER DISCHARGE = 166,000 CFS

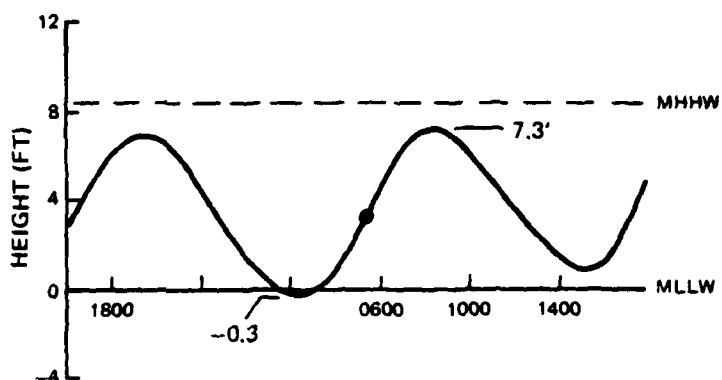


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 10

TIDE HYDROGRAPH FOR  
8 - 9 NOVEMBER 1978

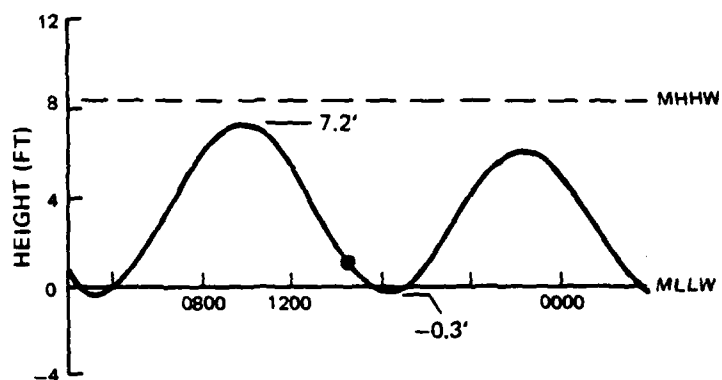
RIVER DISCHARGE = 113,000 CFS



### VOYAGE NO. 11

TIDE HYDROGRAPH FOR  
10 - 11 NOVEMBER 1978

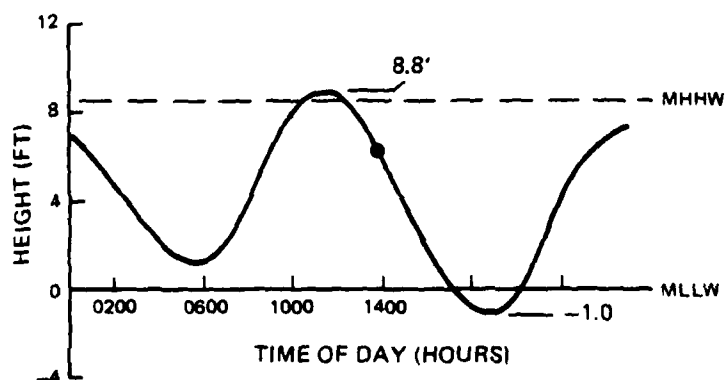
RIVER DISCHARGE = 118,000 CFS



### VOYAGE NO. 12

TIDE HYDROGRAPH FOR  
28 - 29 NOVEMBER 1978

RIVER DISCHARGE = 190,000 CFS

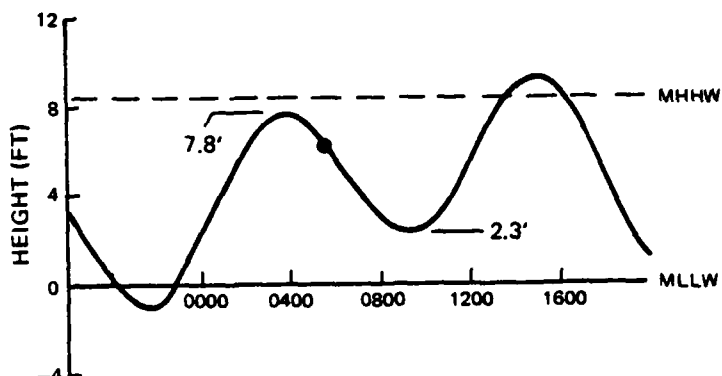


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 13

TIDE HYDROGRAPH FOR  
2 - 3 DECEMBER 1978

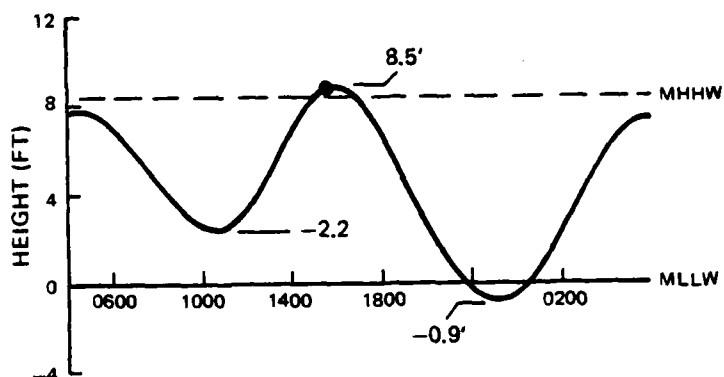
RIVER DISCHARGE = 206,000 CFS



### VOYAGE NO. 14

TIDE HYDROGRAPH FOR  
4 - 5 DECEMBER 1978

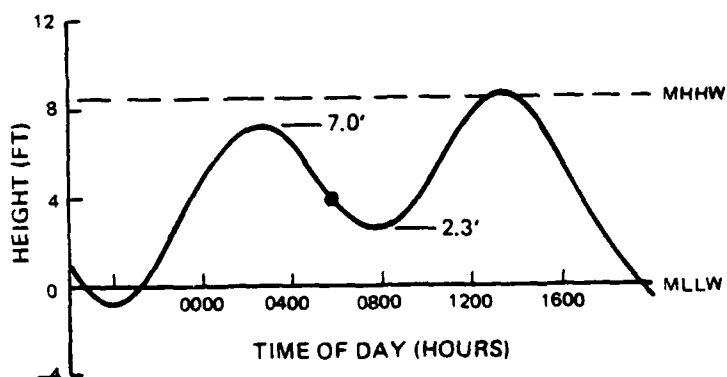
RIVER DISCHARGE = 190,000 CFS



### VOYAGE NO. 15

TIDE HYDROGRAPH FOR  
14 - 15 DECEMBER 1978

RIVER DISCHARGE = 211,000 CFS

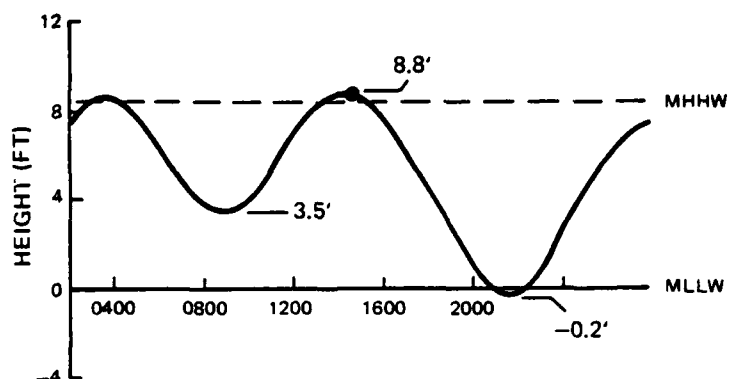


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 16

TIDE HYDROGRAPH FOR  
17 - 18 DECEMBER 1978

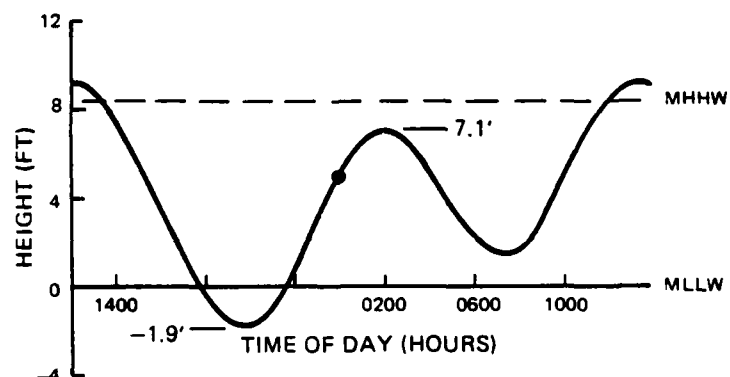
RIVER DISCHARGE = 195,000 CFS



### VOYAGE NO. 17

TIDE HYDROGRAPH FOR  
29 - 30 DECEMBER 1978

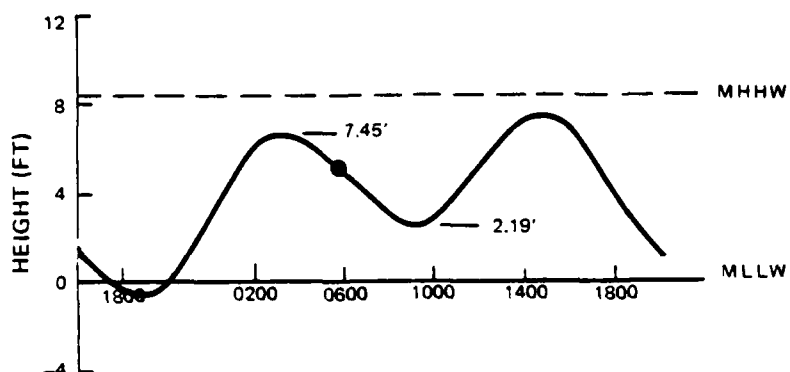
RIVER DISCHARGE = 217,000 CFS



### VOYAGE NO. 18

TIDE HYDROGRAPH FOR  
15 - 16 JAN 1979

RIVER DISCHARGE = 195,000 CFS

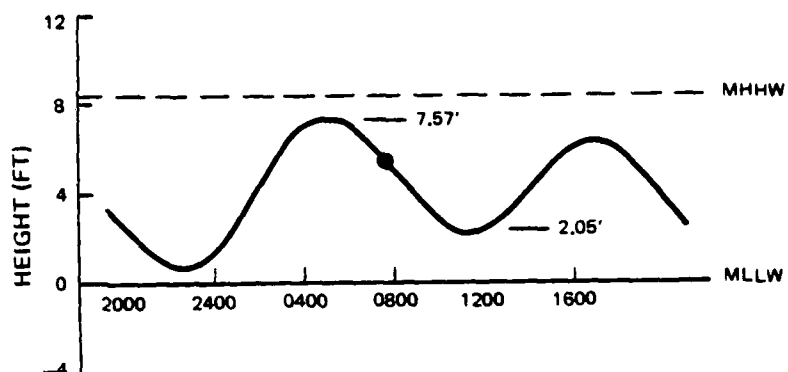


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 19

TIDE HYDROGRAPH FOR  
18 - 19 JAN. 1979

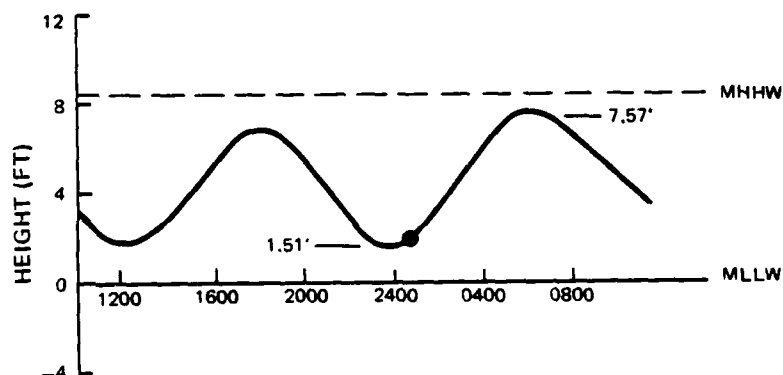
RIVER DISCHARGE = 166,000 CFS



### VOYAGE NO. 20

TIDE HYDROGRAPH FOR  
20 - 21 JAN. 1979

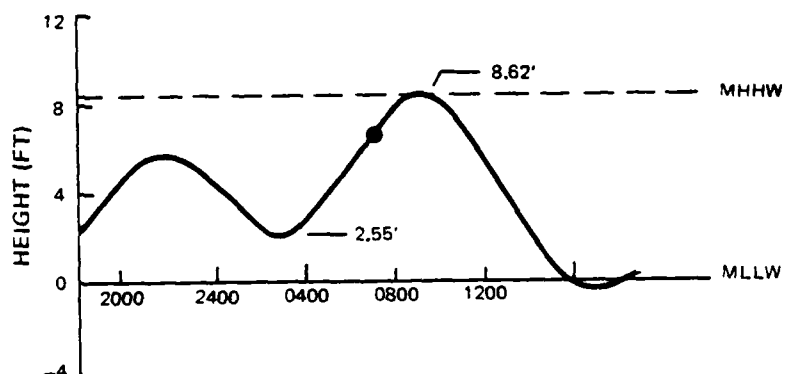
RIVER DISCHARGE = 123,000 CFS



### VOYAGE NO. 21

TIDE HYDROGRAPH FOR  
23 - 24 JAN. 1979

RIVER DISCHARGE = 201,000 CFS



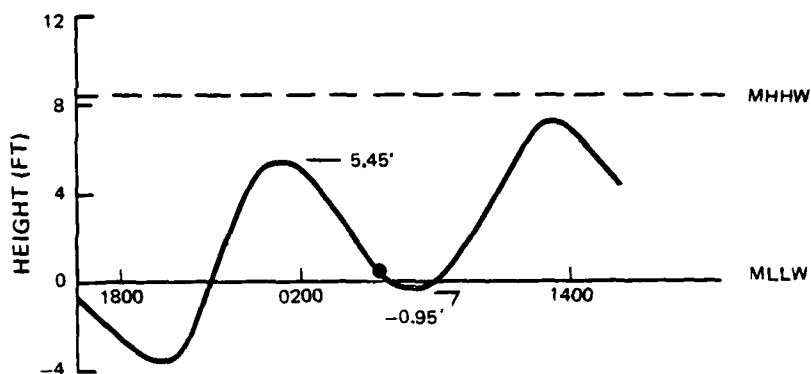
● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING



### VOYAGE NO. 22

TIDE HYDROGRAPH FOR  
27 - 28 JAN. 1979

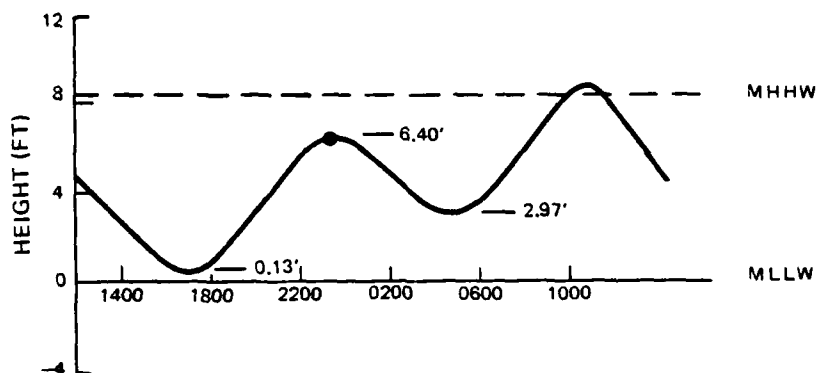
RIVER DISCHARGE = 155,000 CFS



### VOYAGE NO. 23

TIDE HYDROGRAPH FOR  
07 - 08 FEB. 1979

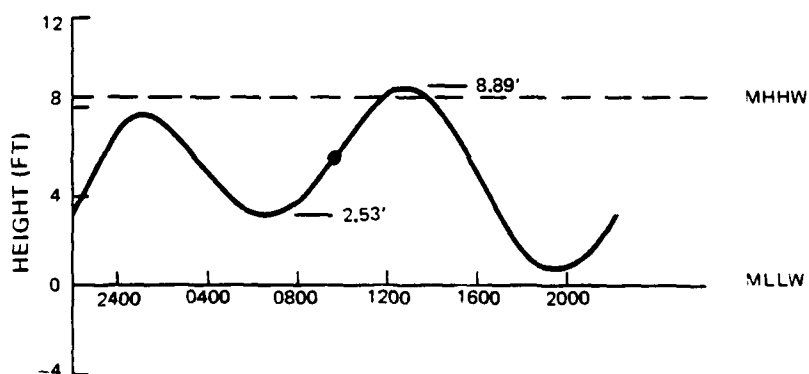
RIVER DISCHARGE = 212,000 CFS



### VOYAGE NO. 24

TIDE HYDROGRAPH FOR  
10 - 11 FEB. 1979

RIVER DISCHARGE = 277,000 CFS

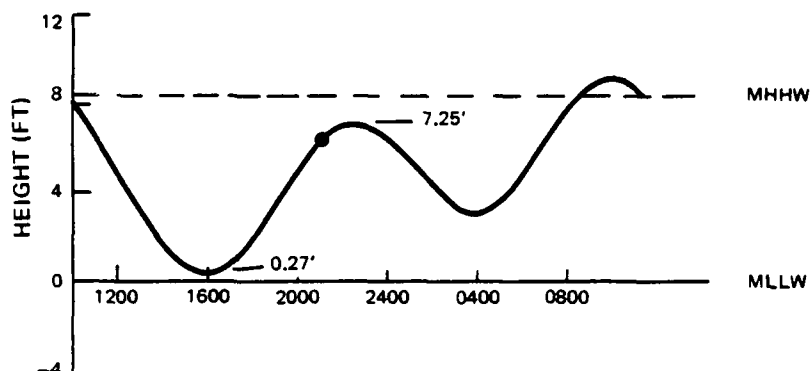


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 25

TIDE HYDROGRAPH FOR  
22 - 23 FEB. 1979

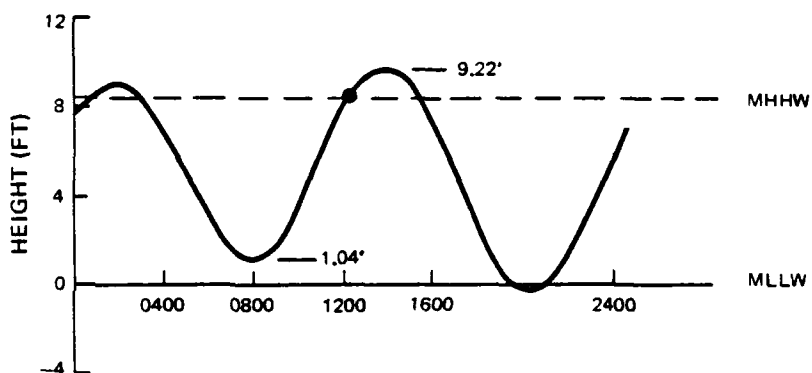
RIVER DISCHARGE - 202,000 CFS



### VOYAGE NO. 26

TIDE HYDROGRAPH FOR  
27 FEB. 1979

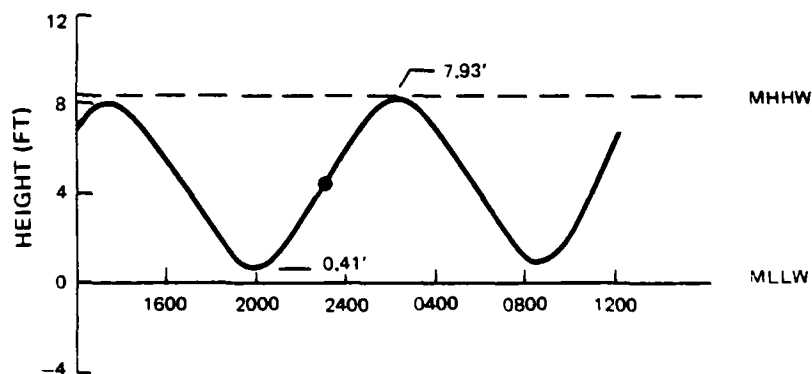
RIVER DISCHARGE = 242,000 CFS



### VOYAGE NO. 27

TIDE HYDROGRAPH FOR  
14 - 15 MAR. 1979

RIVER DISCHARGE = 211,000 CFS

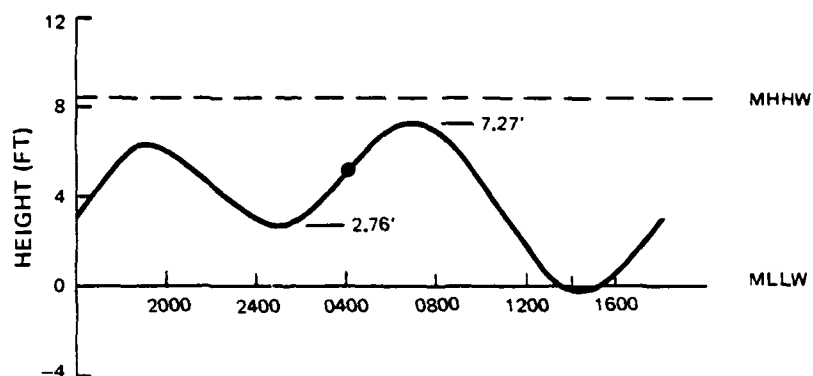


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 28

TIDE HYDROGRAPH FOR  
21 - 22 MAR. 1979

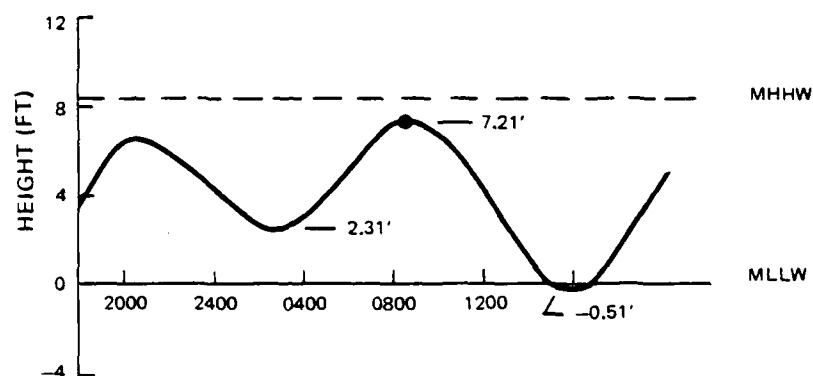
RIVER DISCHARGE = 179,000 CFS



### VOYAGE NO. 29

TIDE HYDROGRAPH FOR  
22 - 23 MAR. 1979

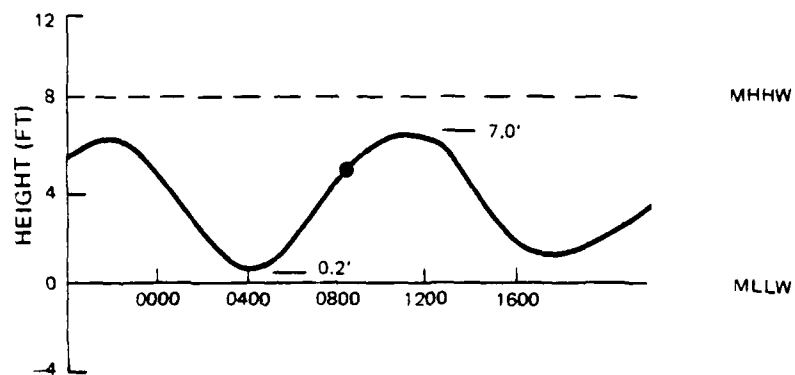
RIVER DISCHARGE = 184,000 CFS



### VOYAGE NO. 30

TIDE HYDROGRAPH FOR  
15 - 16 OCTOBER, 1979

RIVER DISCHARGE = 113,000 CFS



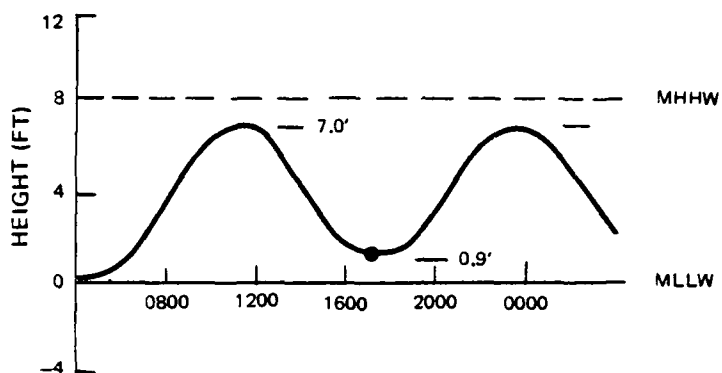
TIME OF DAY (HOURS)

● INDICATES APPROXIMATE MID-POINT BAR CROSSING

### VOYAGE NO. 31

TIDE HYDROGRAPH FOR  
17 - 18 OCTOBER, 1979

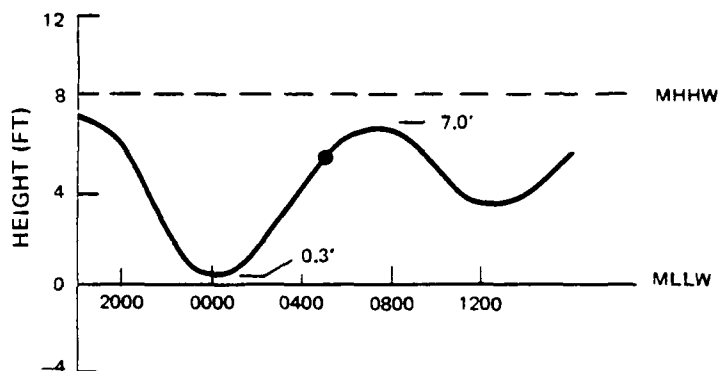
RIVER DISCHARGE = 111,000 CFS



### VOYAGE NO. 32

TIDE HYDROGRAPH FOR  
27 - 28 OCTOBER, 1979

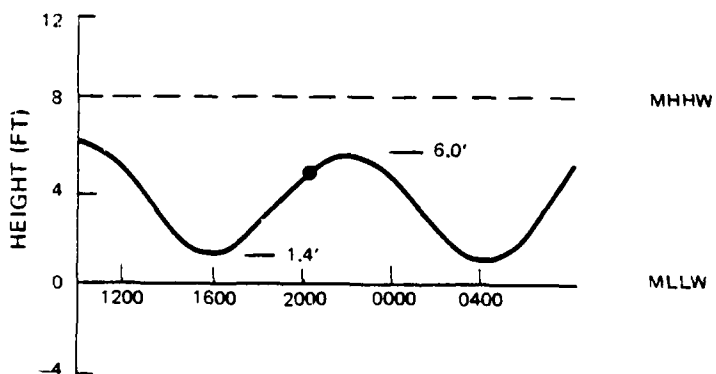
RIVER DISCHARGE = 121,000 CFS



### VOYAGE NO. 33

TIDE HYDROGRAPH FOR  
14 - 15 NOVEMBER, 1979

RIVER DISCHARGE = 108,000 CFS



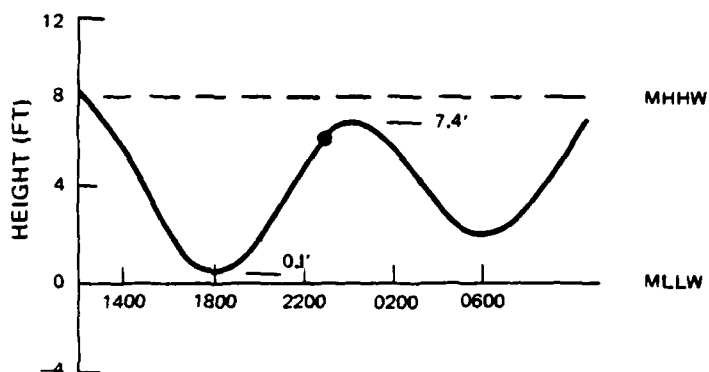
TIME OF DAY (HOURS)

● INDICATES APPROXIMATE MID-POINT BAR CROSSING

### VOYAGE NO. 34

TIDE HYDROGRAPH FOR  
17 - 18 NOVEMBER, 1979

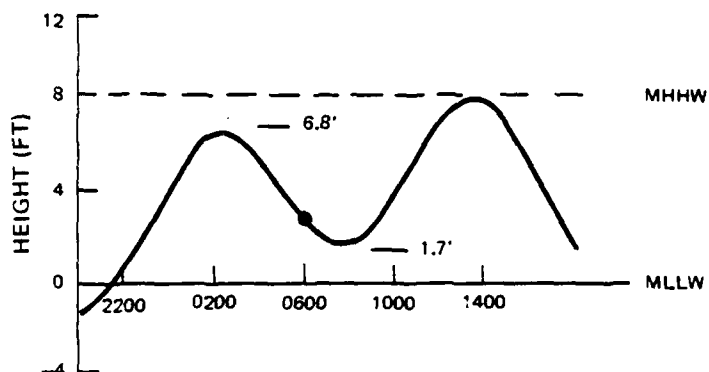
RIVER DISCHARGE = 155,000 CFS



### VOYAGE NO. 35

TIDE HYDROGRAPH FOR  
20 - 21 NOVEMBER, 1979

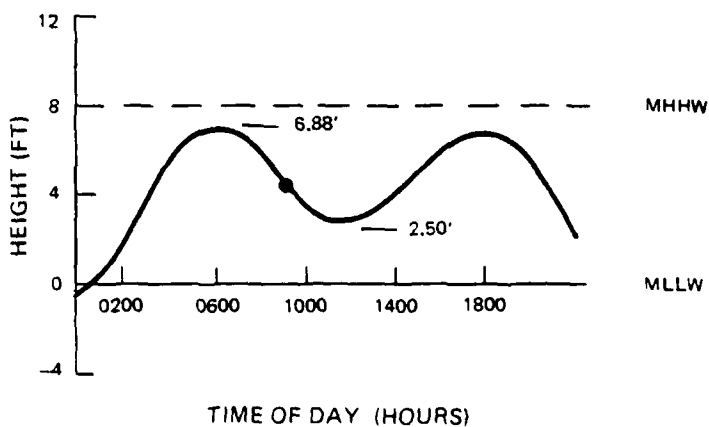
RIVER DISCHARGE = 155,000 CFS



### VOYAGE NO. 36

TIDE HYDROGRAPH FOR  
26 NOVEMBER, 1979

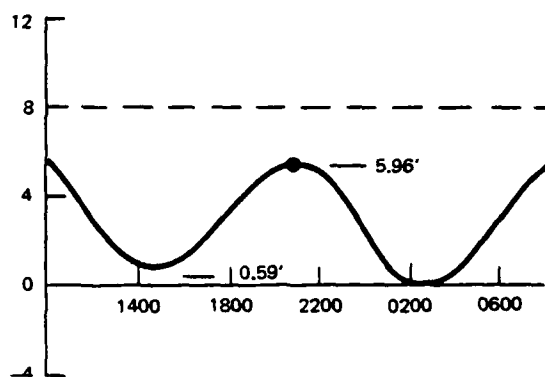
RIVER DISCHARGE = 164,000 CFS



● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

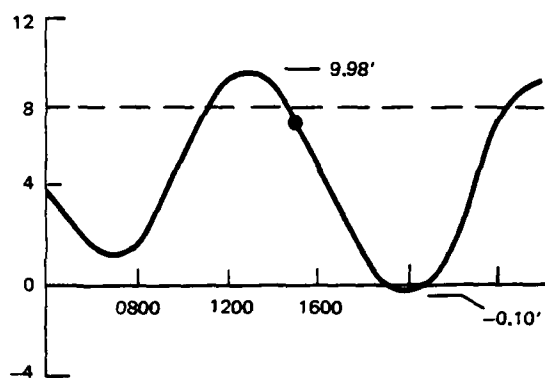
### VOYAGE NO. 37

TIDE HYDROGRAPH FOR  
28 - 29 NOVEMBER, 1979  
RIVER DISCHARGE = 174,000 CFS



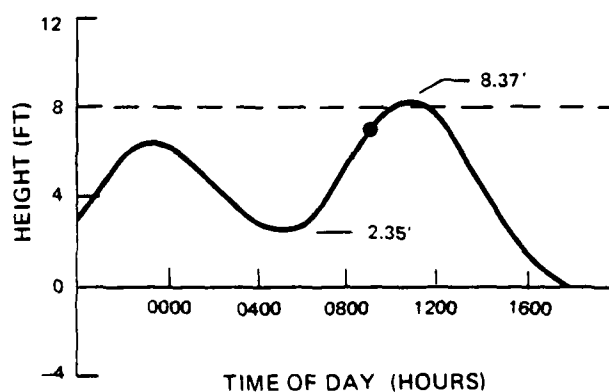
### VOYAGE NO. 38

TIDE HYDROGRAPH FOR  
3 - 4 DECEMBER, 1979  
RIVER DISCHARGE = 225,000 CFS



### VOYAGE NO. 39

TIDE HYDROGRAPH FOR  
15 - 16 DECEMBER, 1979  
RIVER DISCHARGE = 169,000 CFS

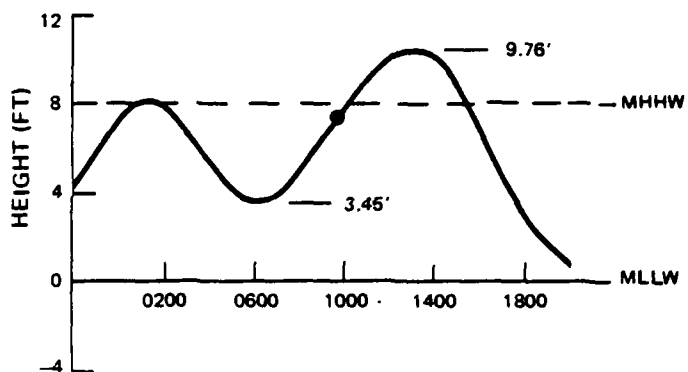


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 40

TIDE HYDROGRAPH FOR  
17 - 18 DECEMBER, 1979

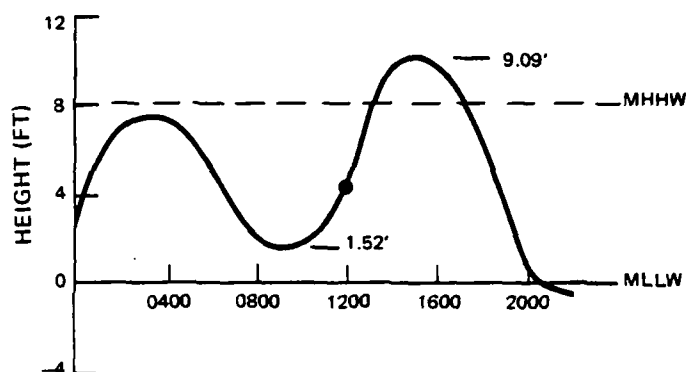
RIVER DISCHARGE = 203,000 CFS



### VOYAGE NO. 41

TIDE HYDROGRAPH FOR  
20 JANUARY, 1980

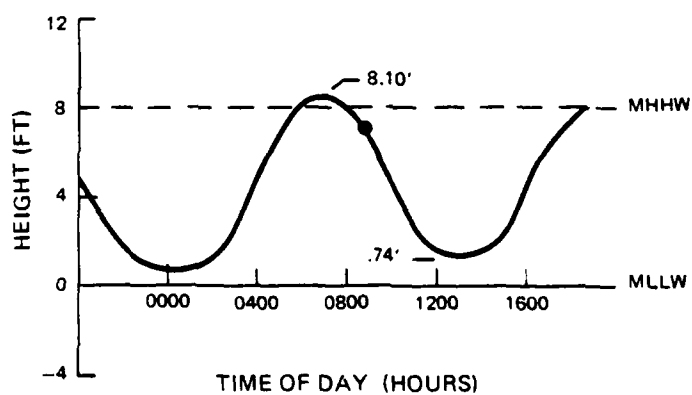
RIVER DISCHARGE = 279,000 CFS



### VOYAGE NO. 42

TIDE HYDROGRAPH FOR  
23 - 24 JANUARY, 1980

RIVER DISCHARGE = 206,000 CFS

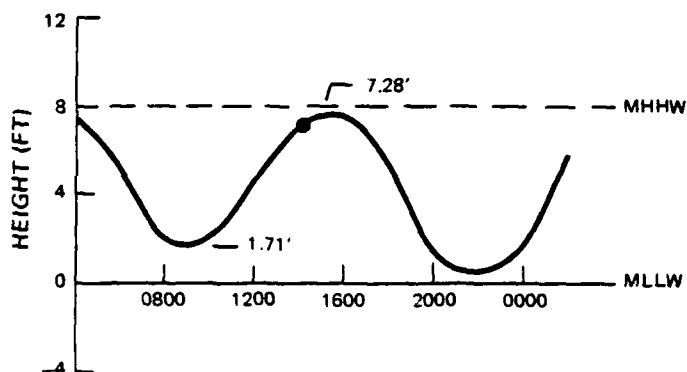


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 43

TIDE HYDROGRAPH FOR  
4 - 5 FEBRUARY, 1980

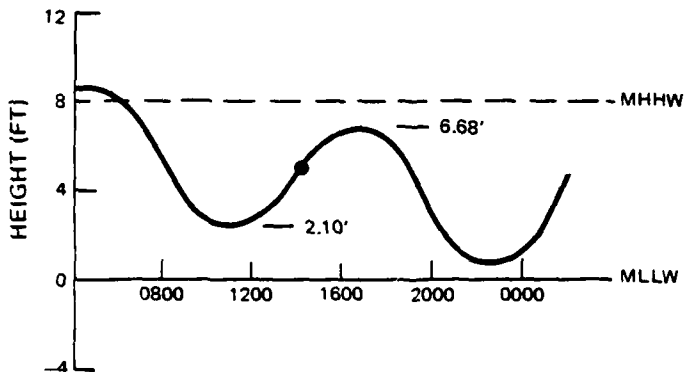
RIVER DISCHARGE = 201,000 CFS



### VOYAGE NO. 44

TIDE HYDROGRAPH FOR  
6 - 7 FEBRUARY, 1980

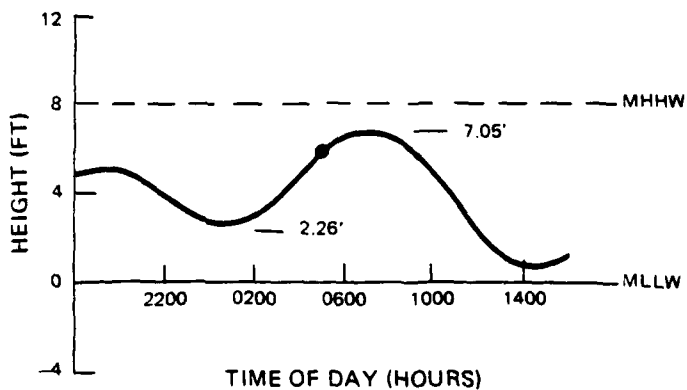
RIVER DISCHARGE = 166,000 CFS



### VOYAGE NO. 45

TIDE HYDROGRAPH FOR  
09 - 10 FEBRUARY, 1980

RIVER DISCHARGE = 139,000 CFS



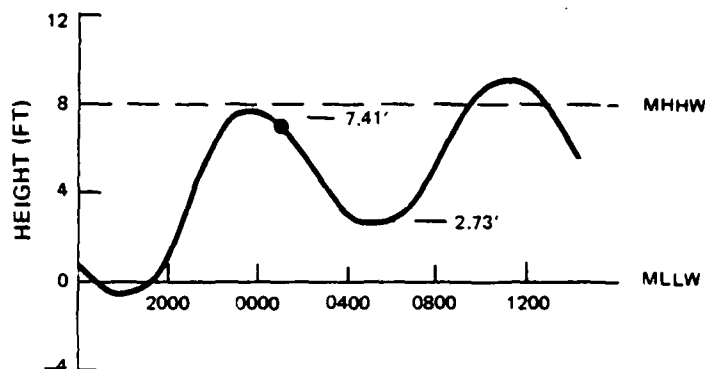
● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING



### VOYAGE NO. 46

TIDE HYDROGRAPH FOR  
13 - 14 FEBRUARY, 1980

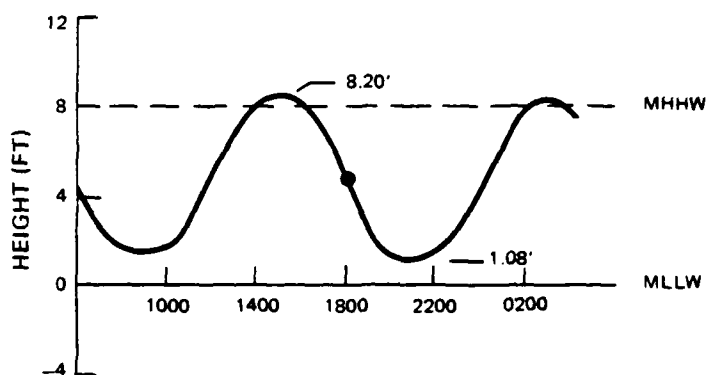
RIVER DISCHARGE = 203,000 CFS



### VOYAGE NO. 47

TIDE HYDROGRAPH FOR  
4 - 5 MARCH, 1980

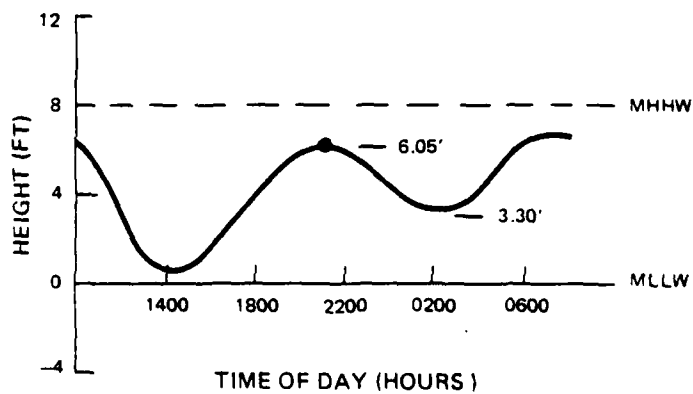
RIVER DISCHARGE = 201,000 CFS



### VOYAGE NO. 48

TIDE HYDROGRAPH FOR  
10 - 11 MARCH, 1980

RIVER DISCHARGE = 128,000 CFS

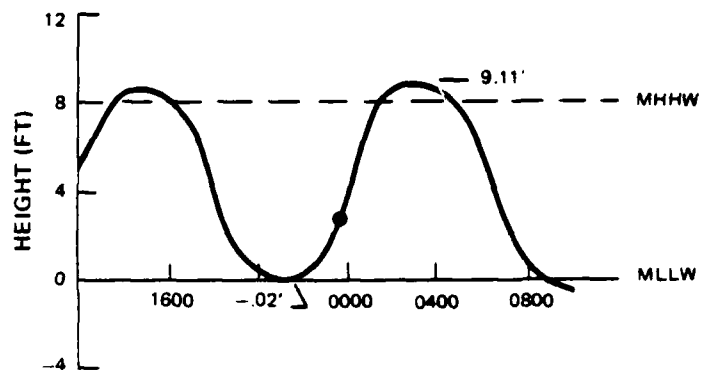


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

### VOYAGE NO. 49

TIDE HYDROGRAPH FOR  
18 - 19 MARCH, 1980

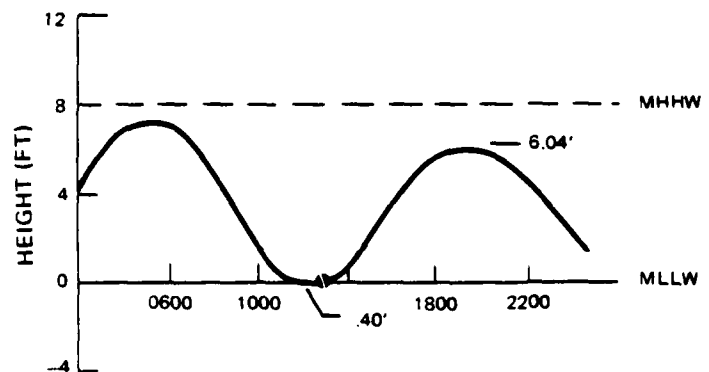
RIVER DISCHARGE = 255,000 CFS



### VOYAGE NO. 50

TIDE HYDROGRAPH FOR  
22 MARCH, 1980

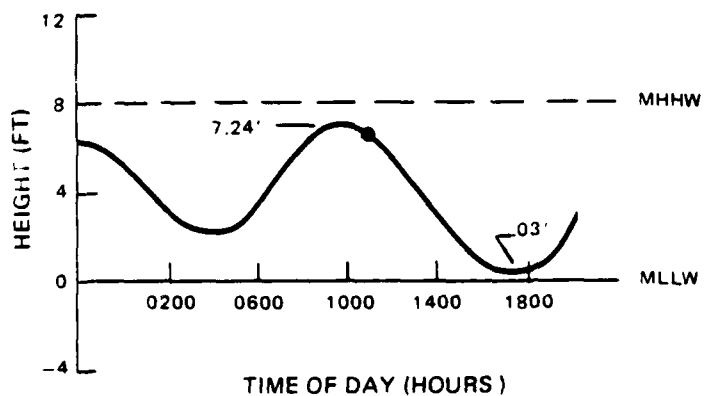
RIVER DISCHARGE = 1640,000



### VOYAGE NO. 51

TIDE HYDROGRAPH FOR  
25 - 26 MARCH, 1980

RIVER DISCHARGE = 128,000 CFS

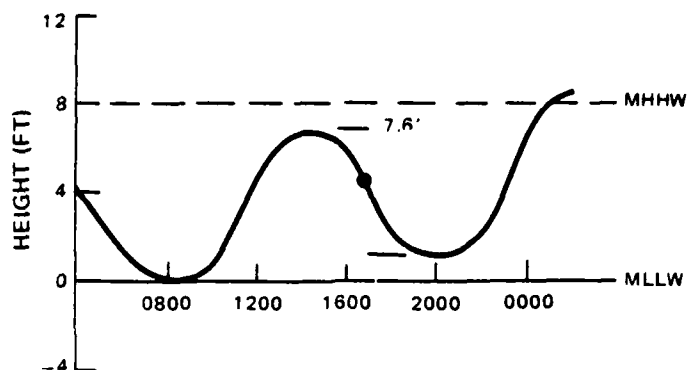


● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

**VOYAGE NO. 52**

TIDE HYDROGRAPH FOR  
1 - 2 APRIL, 1980

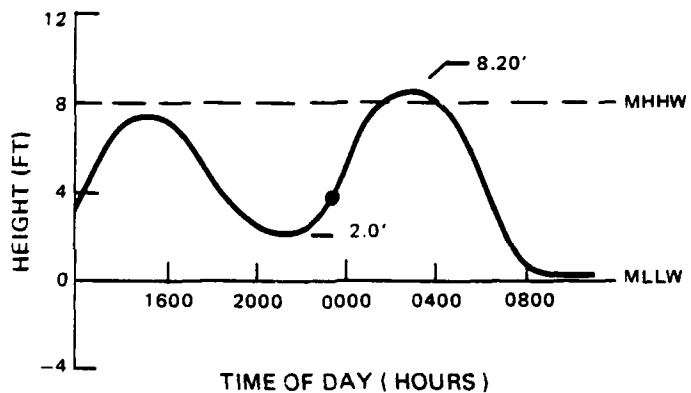
RIVER DISCHARGE = 171,000 CFS



**VOYAGE NO. 53**

TIDE HYDROGRAPH FOR  
3 - 4 APRIL, 1980

RIVER DISCHARGE = 179,000



● INDICATES APPROXIMATE MID-POINT OF BAR CROSSING

APPENDIX I  
ENCOUNTER PERIODS BASED ON OBSERVED WAVE DATA

ENCOUNTER PERIOD BASED ON OBSERVED WAVE DATA<sup>†</sup>  
(Phase I)

| VOYAGE<br>NUMBER | SHIP<br>SPEED<br>(Kts) | SHIP'S<br>COURSE<br>MADE<br>GOOD<br>(Deg) | OBSERVED<br>SWELL<br>DIRECTION<br>(Deg) | ANGLE OF<br>INCIDENCE<br>$\beta$<br>(Deg) | OBSERVED<br>SWELL<br>PERIOD<br>(Sec) | ENCOUNTER<br>PERIOD<br>(Sec) |
|------------------|------------------------|-------------------------------------------|-----------------------------------------|-------------------------------------------|--------------------------------------|------------------------------|
| 1                | 10                     | 44.5                                      | 315                                     | 90.5                                      | 8                                    | 8.0                          |
| 2                | 12.5                   | 44.1                                      | 270                                     | 45.9                                      | 8                                    | 12.5                         |
| 3 <sup>Δ</sup>   | 13                     | --                                        | 270                                     | --                                        | 9                                    | --                           |
| 4                | 14                     | 43.7                                      | 247.5                                   | 23.8                                      | 9                                    | 17.0                         |
| 5                | 13                     | 46.2                                      | 292.5                                   | 66.3                                      | 8                                    | 10.2                         |
| 6                | 14                     | 48.0                                      | 315                                     | 87.0                                      | 8                                    | 8.3                          |
| 7                | 14                     | 221.6                                     | 292.5                                   | 109.1                                     | 7                                    | 5.8                          |
| 8 <sup>Δ</sup>   | 11                     | --                                        | 315                                     | --                                        | 11                                   | --                           |
| 9                | 13.5                   | 222.9                                     | 292.5                                   | 110.4                                     | 10                                   | 8.7                          |
| 10               | 13                     | 42.4                                      | 315                                     | 92.6                                      | 8                                    | 7.8                          |
| 11               | 15                     | 225.9                                     | 315                                     | 90.9                                      | 8                                    | 7.9                          |
| 12               | 15                     | 54.9                                      | 247.5                                   | 12.6                                      | 8                                    | 20.2                         |
| 13 <sup>Δ</sup>  | 13                     | 42.9                                      | 270                                     | 47.1                                      | --                                   | --                           |
| 14 <sup>Δ</sup>  | 11.5                   | --                                        | 292.5                                   | --                                        | 9                                    | --                           |
| 15               | 8                      | 44.2                                      | 270                                     | 45.8                                      | 8                                    | 10.4                         |
| 16               | 6                      | 226.9                                     | 270                                     | 136.9                                     | 3                                    | 6.3                          |
| 17 <sup>Δ</sup>  | 17                     | 46.9                                      | --                                      | --                                        | --                                   | --                           |
| 18               | 13                     | 43.4                                      | 292.5                                   | 69.1                                      | 8                                    | 9.9                          |
| 19               | 8                      | 223.9                                     | 270                                     | 133.9                                     | 10-11                                | 8.9                          |
| 20               | 17                     | 43.9                                      | 247.5                                   | 23.6                                      | 10-11                                | 20.6                         |
| 21               | 17                     | 45.1                                      | 337.5<br>270                            | 112.4<br>44.9                             | 8-10<br>3                            | 7.3<br>15.9                  |
| 22               | 17                     | 44.4                                      | 292.5                                   | 68.1                                      | 10                                   | 12.6                         |
| 23               | 18.5                   | 49.9                                      | 270                                     | 40.1                                      | 10                                   | 18.8                         |
| 24               | 16                     | 55.8                                      | 202.5                                   | 33.3                                      | 9                                    | 17.8                         |
| 25 <sup>Δ</sup>  | 17                     | --                                        | 202.5                                   | --                                        | 9                                    | --                           |
| 26               | 16                     | 52.0                                      | 225<br>270                              | 7.0<br>38.0                               | 9<br>10                              | 23.2<br>17.1                 |
| 27               | 15                     | 44.7                                      | 270                                     | 45.3                                      | 10                                   | 15.3                         |
| 28               | 13                     | 45.9                                      | 292.5                                   | 66.6                                      | 10                                   | 12.1                         |
| 29 <sup>Δ</sup>  | 10.5                   | --                                        | 270                                     | --                                        | 10                                   | --                           |

<sup>Δ</sup> Data unavailable

$$P_e = \frac{T}{1 - \frac{V \cos \beta}{37}} (0.5921 V \cos \beta) \text{ where } P_e = \text{encounter period sec}$$

$T$  = wave period sec  
 $V$  = ship's speed knots  
 $\beta$  = angle of incidence deg

ENCOUNTER PERIOD BASED ON OBSERVED WAVE DATA<sup>†</sup>  
(Phase II)

| VOYAGE<br>NUMBER | SHIP<br>SPEED<br>(Kts) | SHIP'S<br>COURSE<br>MADE<br>GOOD<br>(Deg) | OBSERVED<br>SWELL<br>DIRECTION<br>(Deg) | ANGLE OF<br>INCIDENCE<br>θ<br>(Deg) | OBSERVED<br>SWELL<br>PERIOD<br>(Sec) | ENCOUNTER<br>PERIOD<br>(Sec) |
|------------------|------------------------|-------------------------------------------|-----------------------------------------|-------------------------------------|--------------------------------------|------------------------------|
| 30               | 14                     | 43.6                                      | 315                                     | 91.4                                | 8                                    | 7.9                          |
| 31               | 10                     | 226.7                                     | 270                                     | 136.7                               | 8                                    | 6.2                          |
| 32               | 16                     | 49.7                                      | 270                                     | 40.3                                | 10                                   | 16.7                         |
| 33               | 14                     | 52.8                                      | 270                                     | 37.2                                | 10                                   | 15.8                         |
| 34               | 14                     | 222.6                                     | 270                                     | 132.6                               | 9                                    | 6.7                          |
| 35               | 13                     | 225                                       | 225                                     | 180                                 | 8-10                                 | 6.1                          |
| 36               | 17                     | 68.6                                      | 270                                     | 21.4                                | 8                                    | 23.0                         |
| 37               | 14                     | 57.1                                      | 270                                     | 32.9                                | 10                                   | 16.3                         |
| 38               | 14                     | 223.8                                     | 180                                     | 136.2                               | 6-7                                  | 4.3                          |
| 39               | 13                     | 44.9                                      | 270                                     | 45.1                                | 8                                    | 12.9                         |
| 40               | 12                     | 231.5                                     | 225                                     | 173.5                               | 8                                    | 5.4                          |
| 41 <sup>1</sup>  | 14                     | --                                        | 202.5                                   | --                                  | 8-10                                 | --                           |
| 42               | 17                     | 44.5                                      | 292.5                                   | 68                                  | 13                                   | 15.5                         |
| 43               | 15                     | 50.7                                      | 270                                     | 39.3                                | 10                                   | 16.2                         |
| 44               | 8                      | 230.5                                     | 270                                     | 140.5                               | 3                                    | 6.4                          |
| 45 <sup>1</sup>  | 14                     | --                                        | 270                                     | --                                  | 10                                   | --                           |
| 46               | 14                     | 221.3                                     | 225                                     | 176.3                               | 8-10                                 | 6.0                          |
| 47               | 13                     | 45.4                                      | 292.5                                   | 67.1                                | 8-10                                 | 11.1                         |
| 48               | 12                     | 47.0                                      | 270                                     | 43                                  | 8-9                                  | 12.9                         |
| 49 <sup>1</sup>  | 14                     | --                                        | 270                                     | --                                  | 13                                   | --                           |
| 50               | 14                     | 225.0                                     | 292.5                                   | 112.5                               | 12-13                                | 11.0                         |
| 51               | 14                     | 44.7                                      | 292.5                                   | 67.8                                | 6-8                                  | 9.3                          |
| 52               | 16                     | 42.3                                      | 292.5                                   | 70.2                                | 11                                   | 14.1                         |
| 53               | 14                     | 49.6                                      | 270                                     | 40.4                                | 8-10                                 | 15.1                         |

<sup>1</sup> Data unavailable

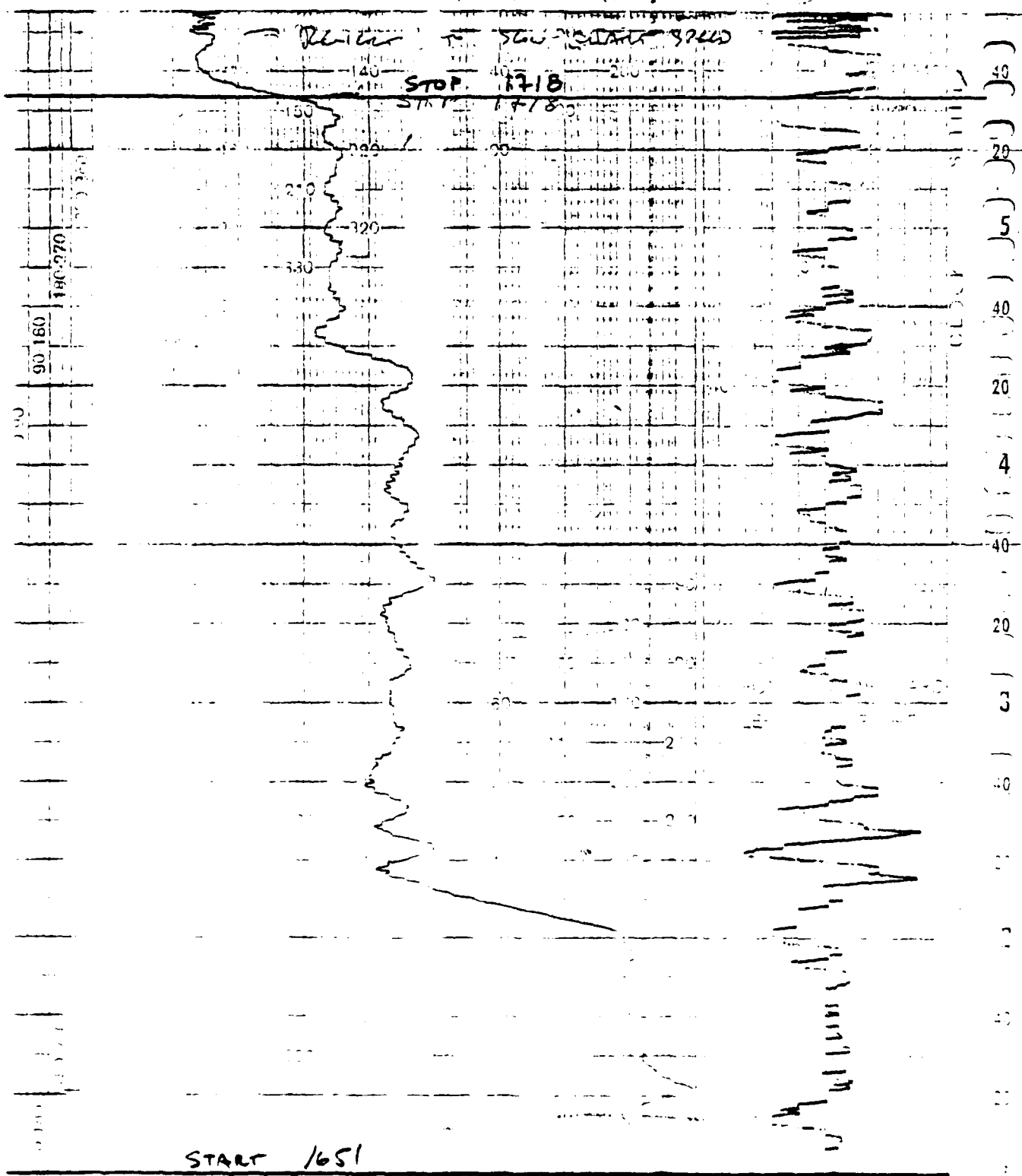
$$P_e = \frac{T}{1 - \frac{V \cos \theta}{T}} \quad \text{where } P_e = \text{encounter period sec}$$

$T$  = wave period sec  
 $V$  = ship's speed knots  
 $\theta$  = angle of incidence deg

APPENDIX J  
STRIP CHART RECORDINGS OF RUDDER DEFLECTIONS  
FOR VOYAGE NOS. 30 AND 31

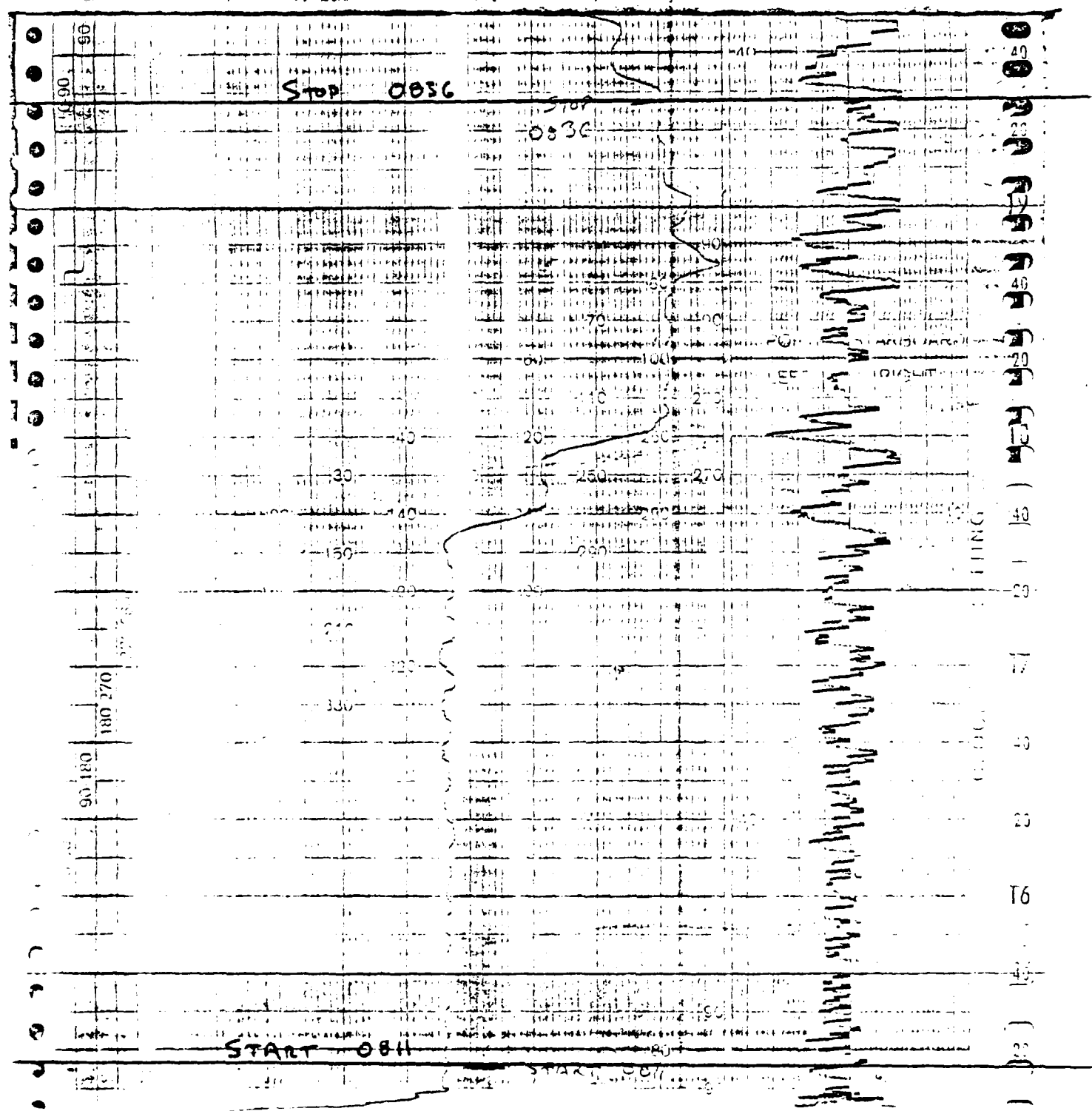
# Rudder Angle & Course Record

VOLTAJE 31  
PAGE 9/11

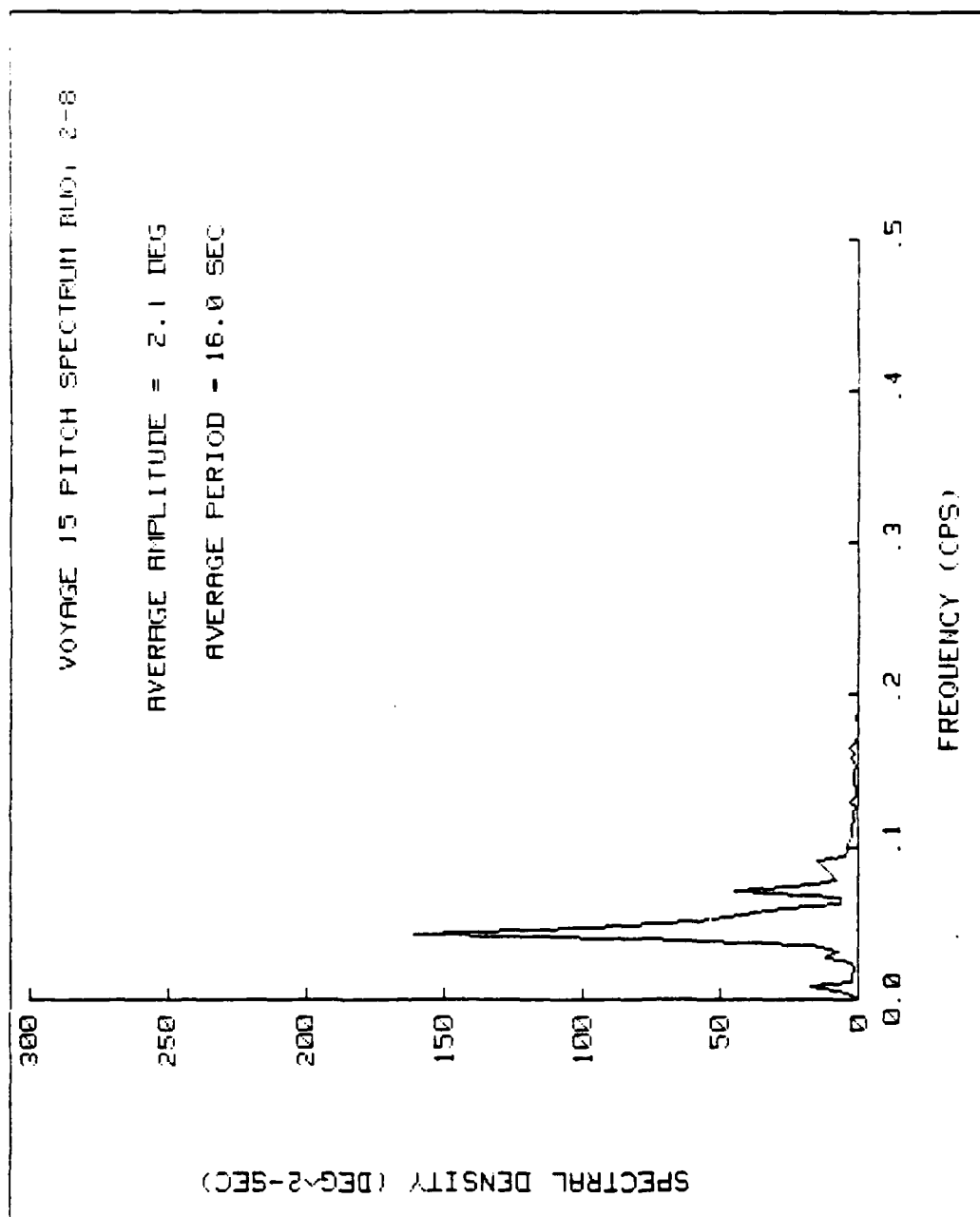


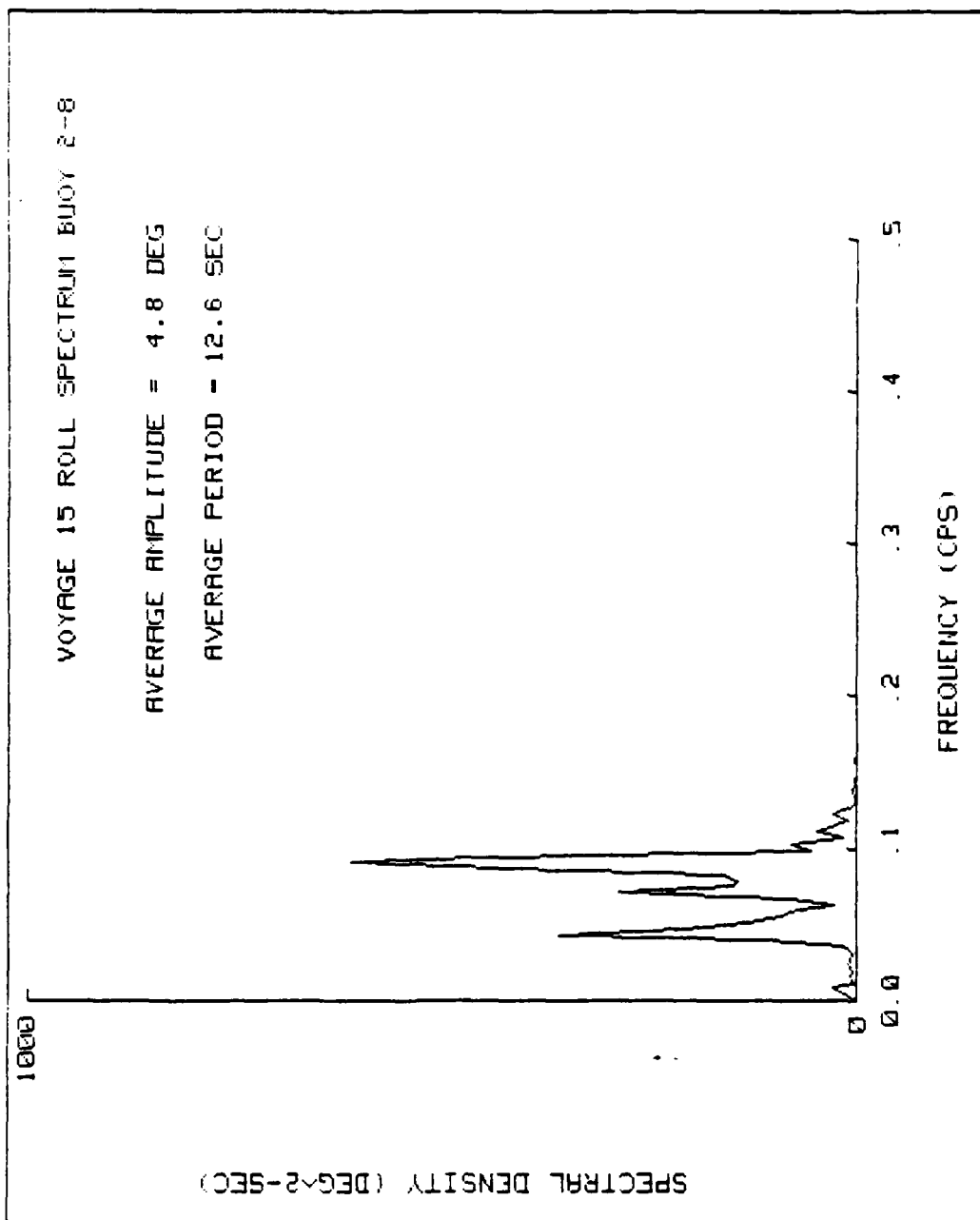


Rudder Angle & Course Record



APPENDIX K  
PLOTS OF SHIP MOTION SPECTRA FOR SELECTED VOYAGES

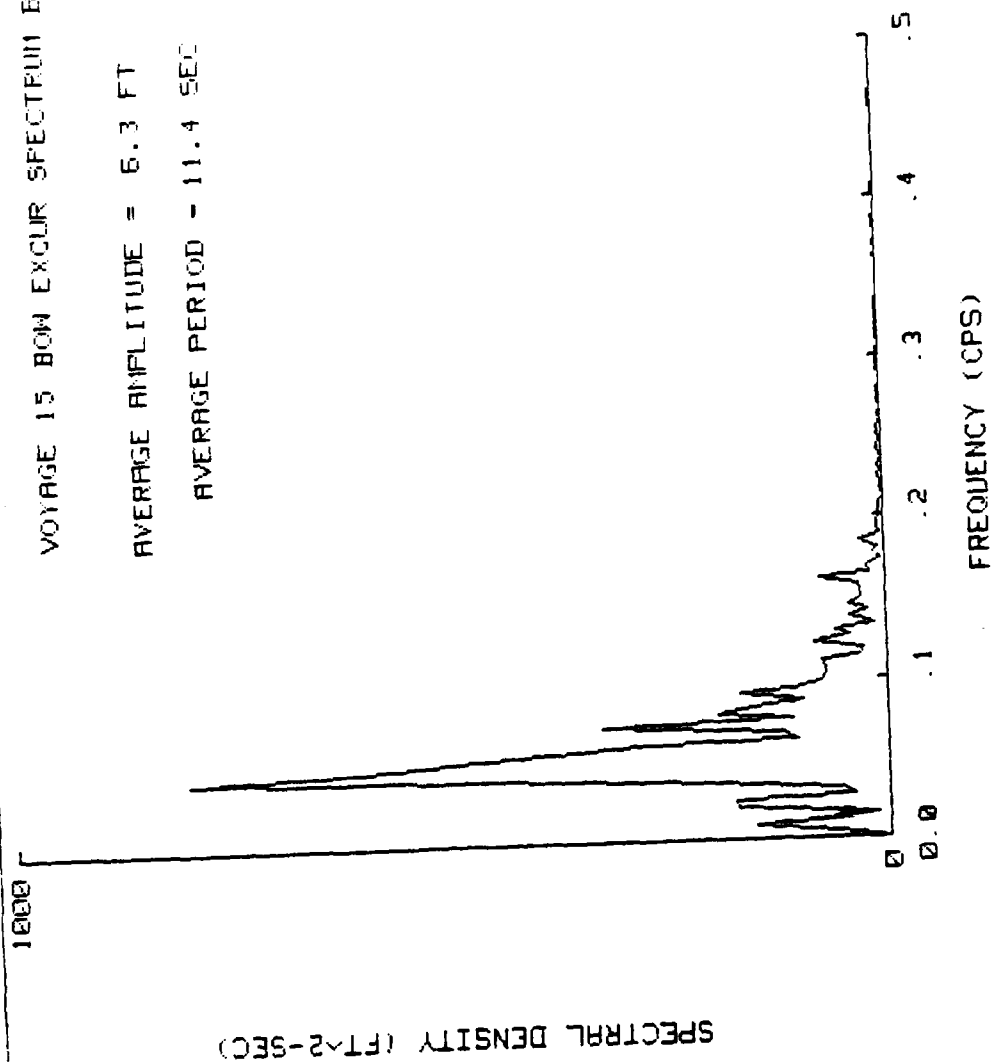


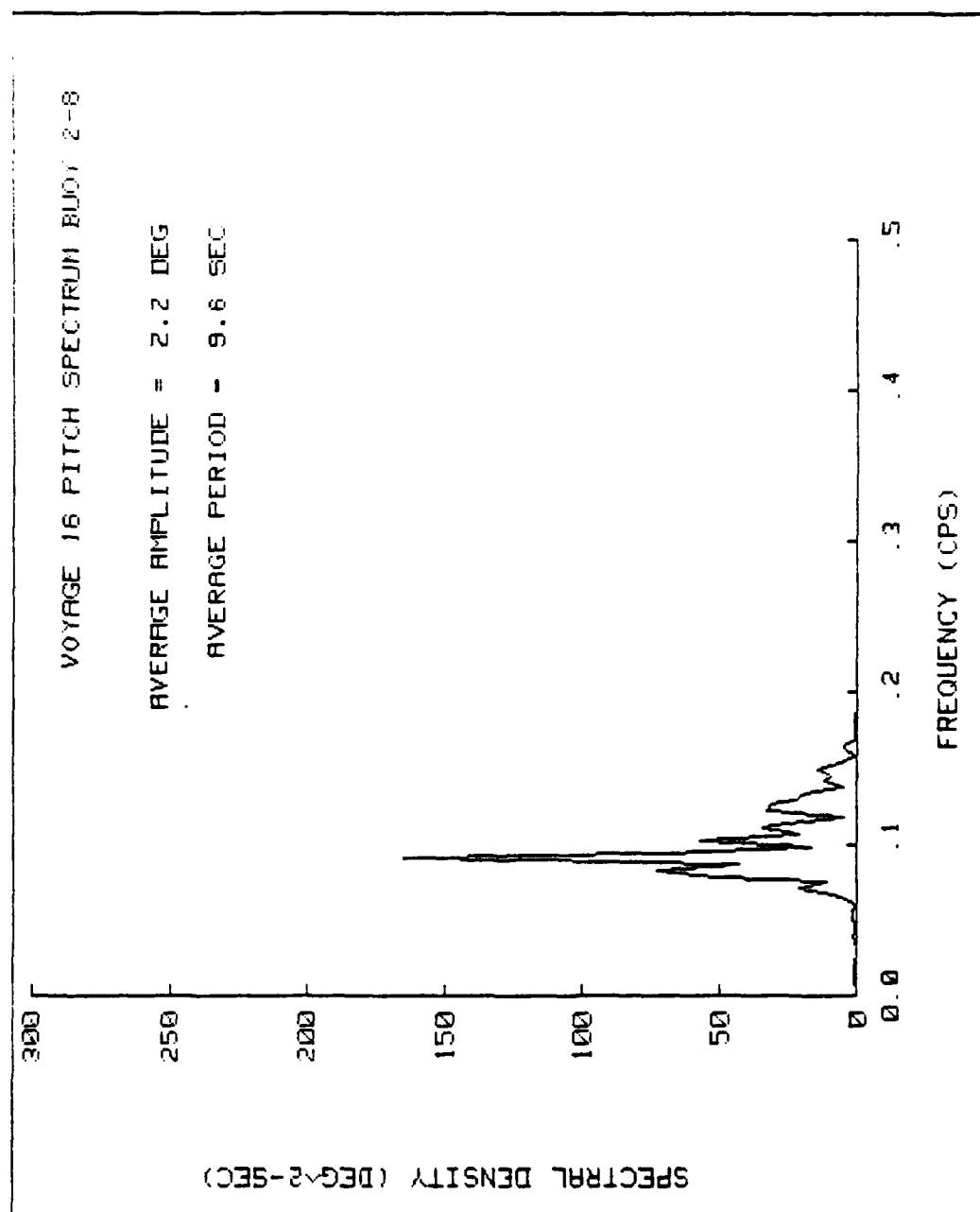


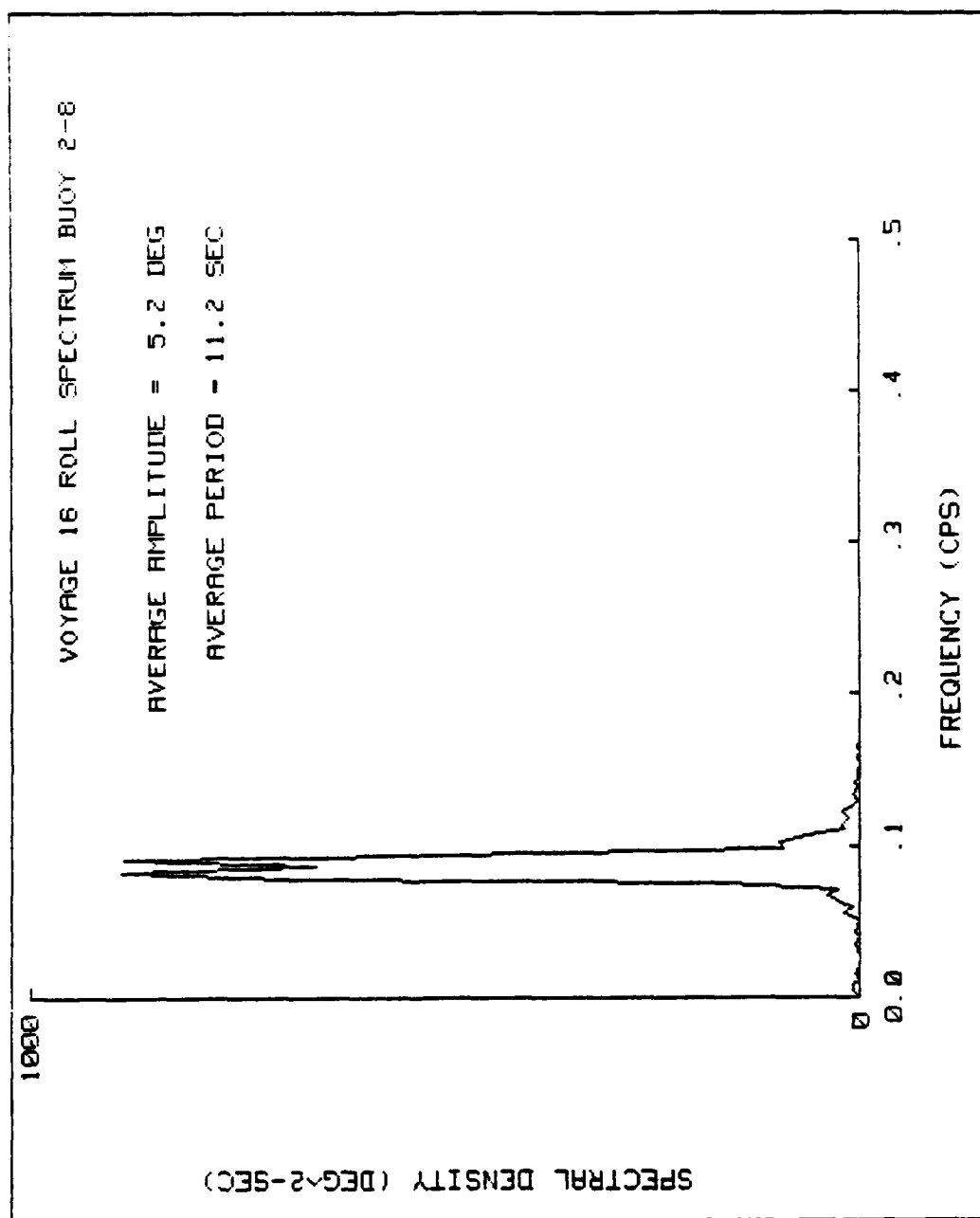
VOYAGE 15 BOW EXCUR SPECTRUM BUOY 2-8

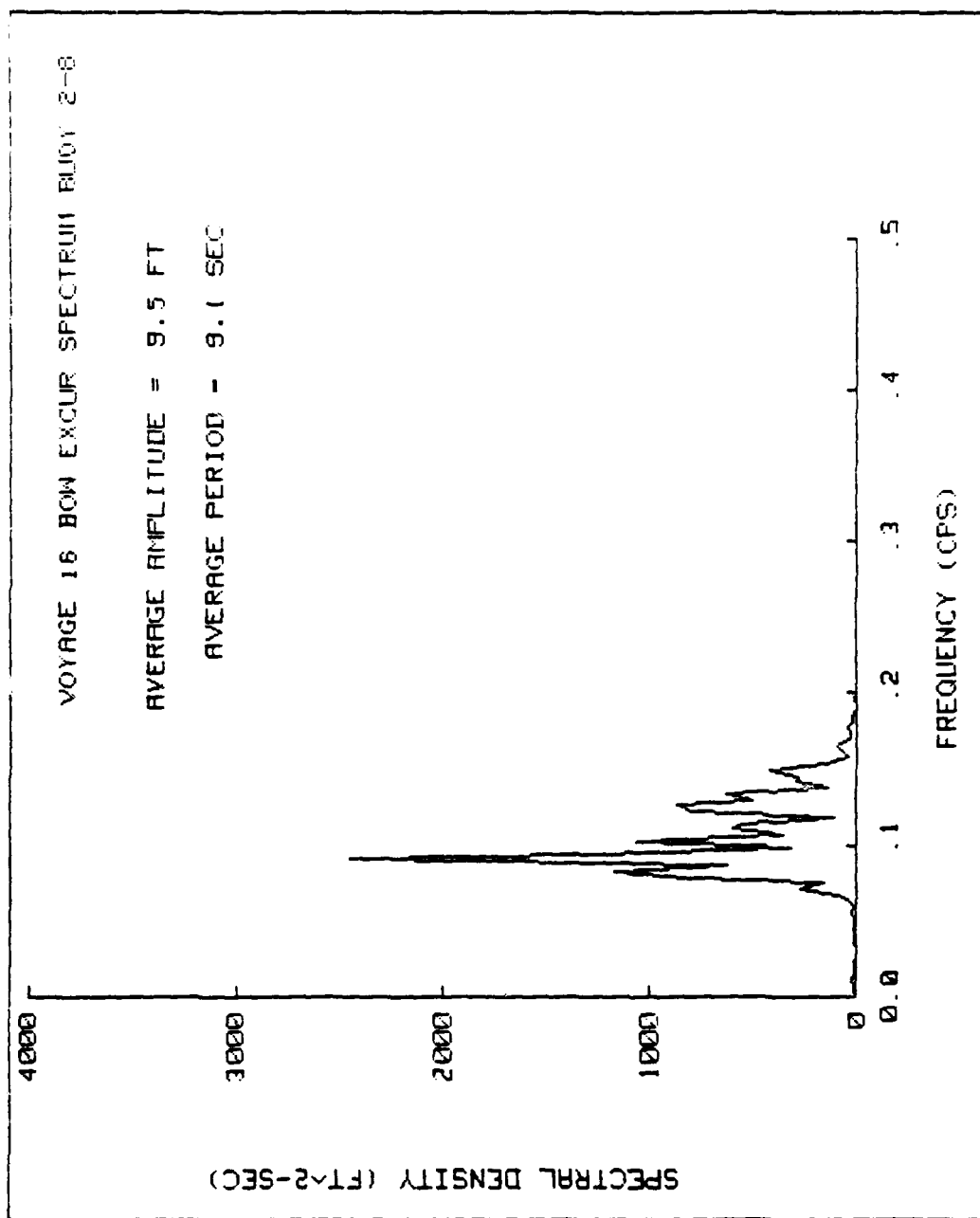
AVERAGE AMPLITUDE = 6.3 FT

AVERAGE PERIOD = 11.4 SEC

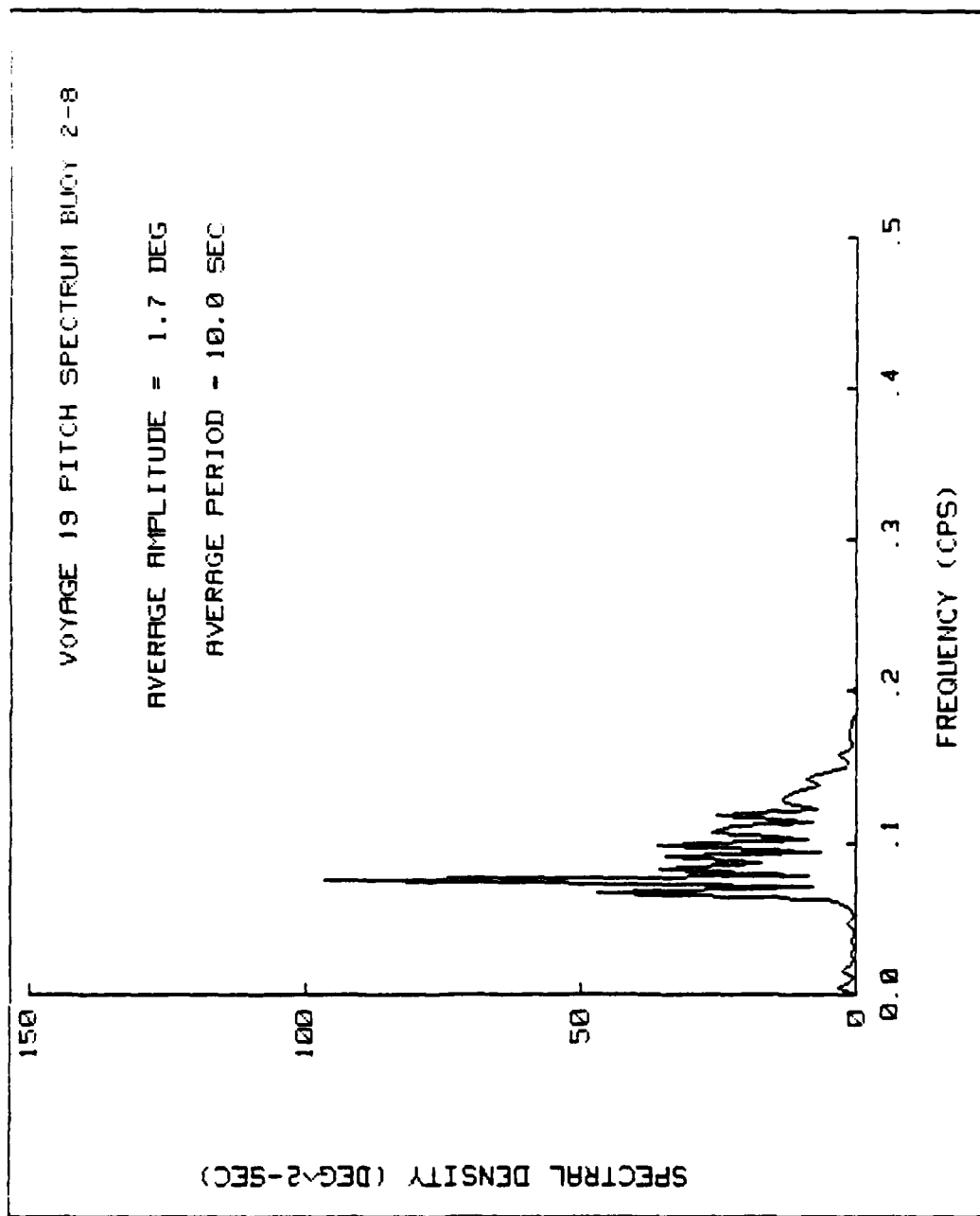


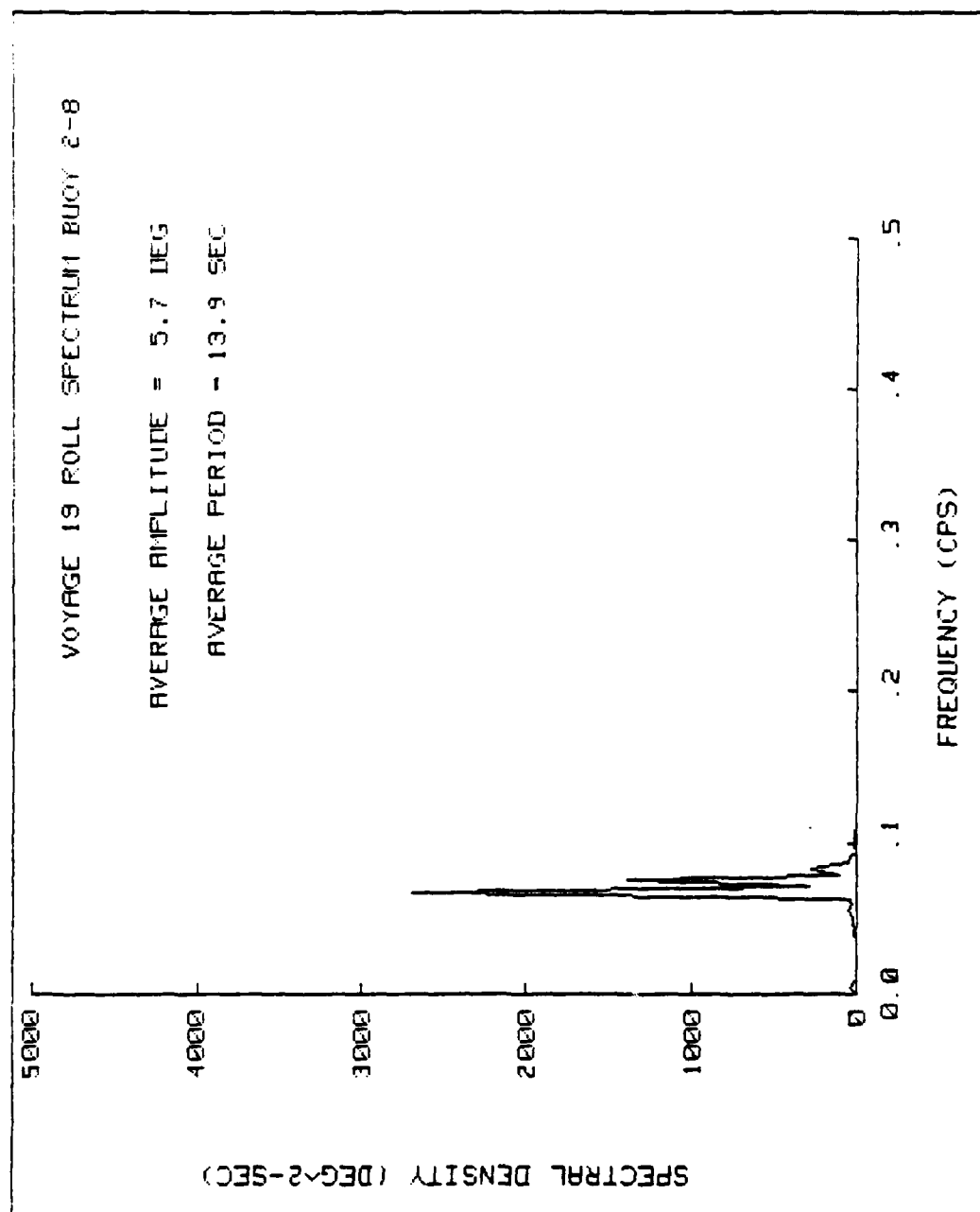


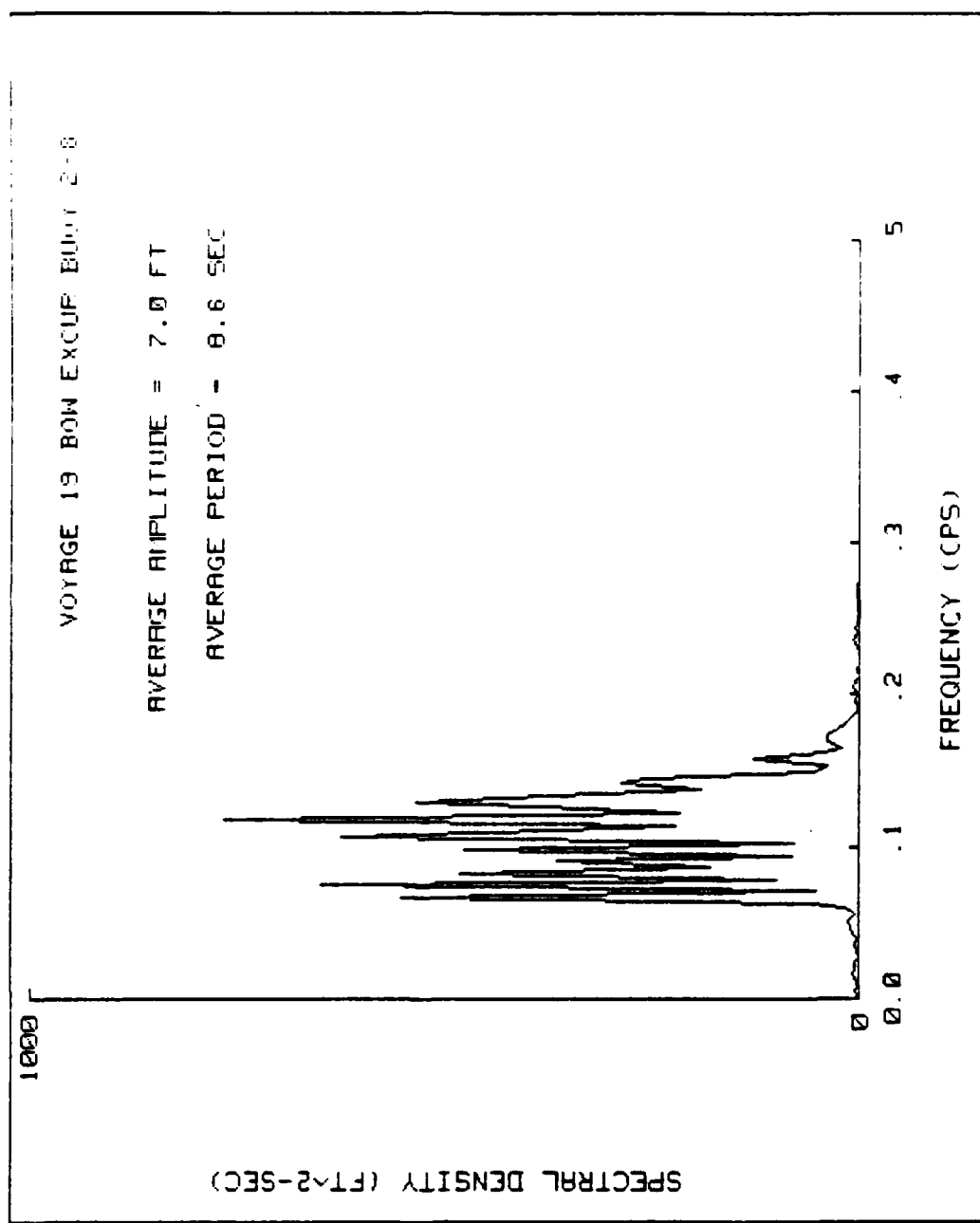


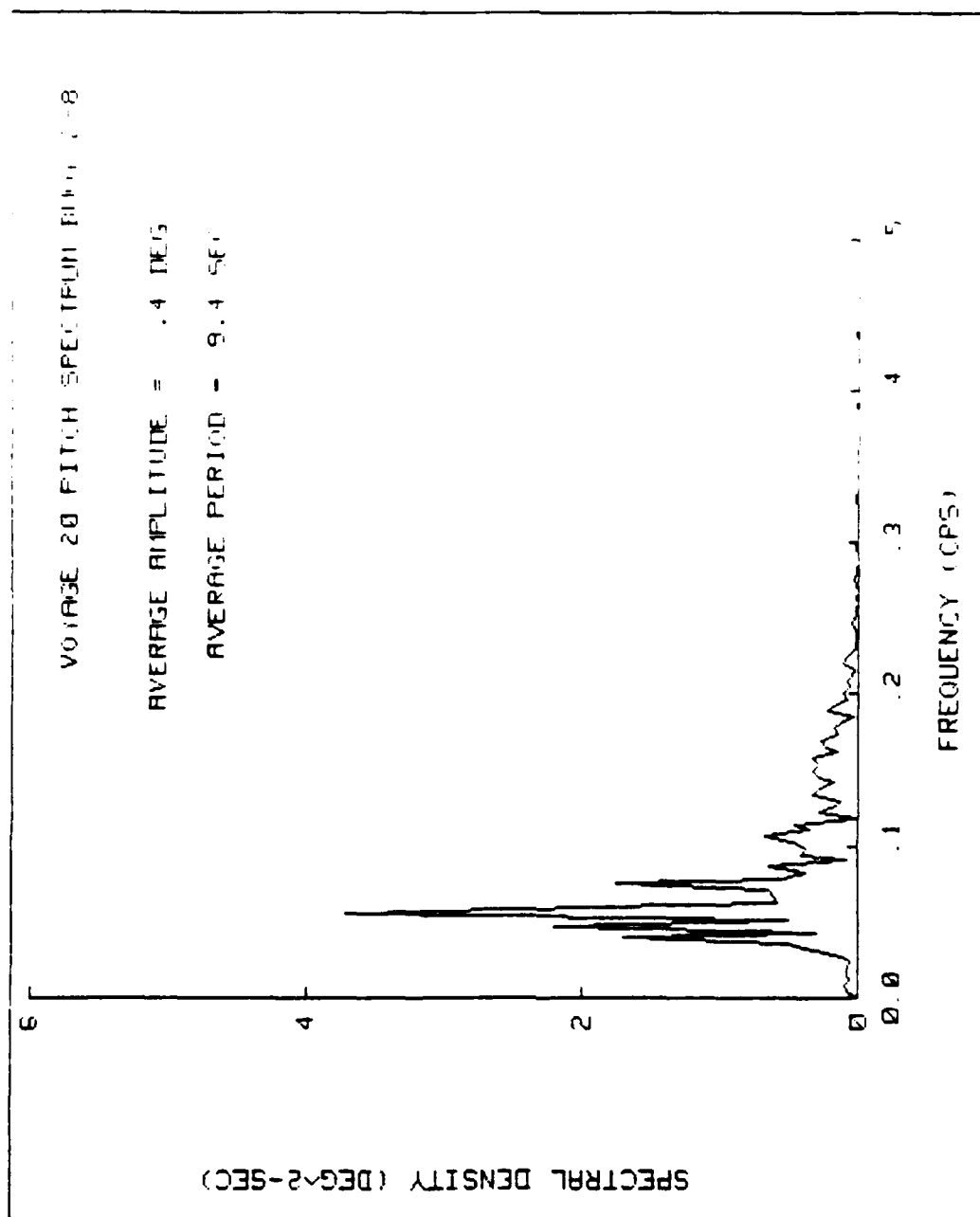


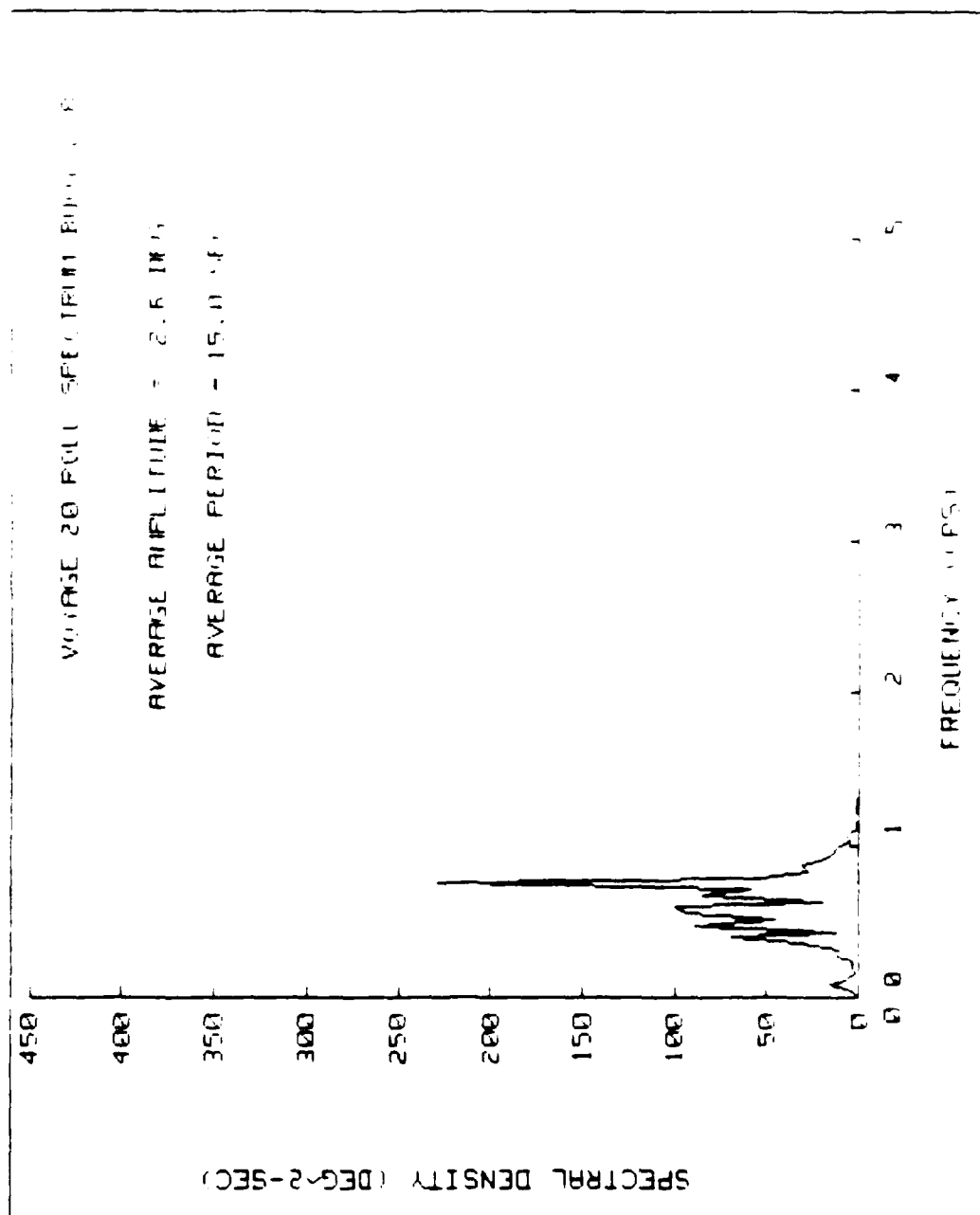


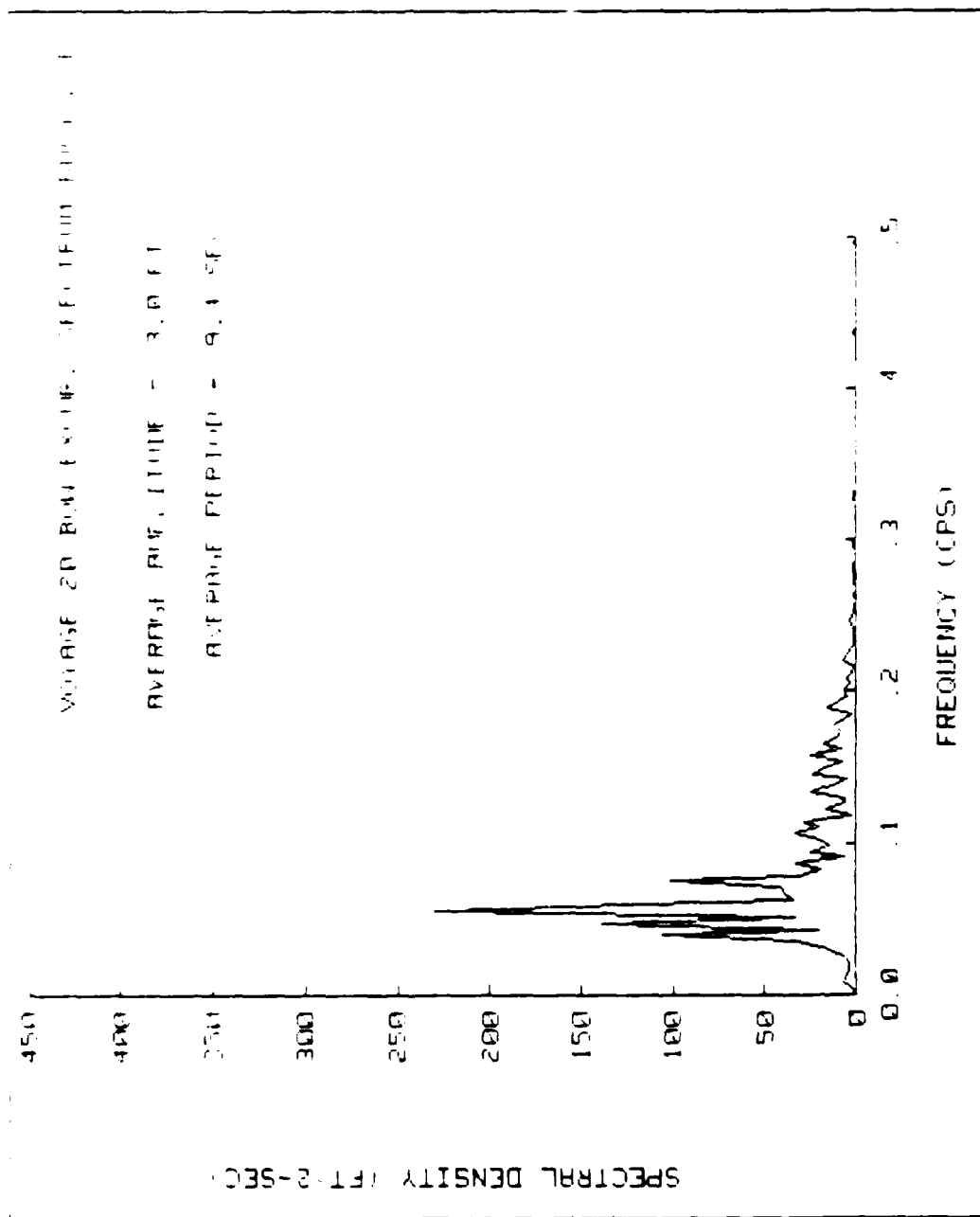








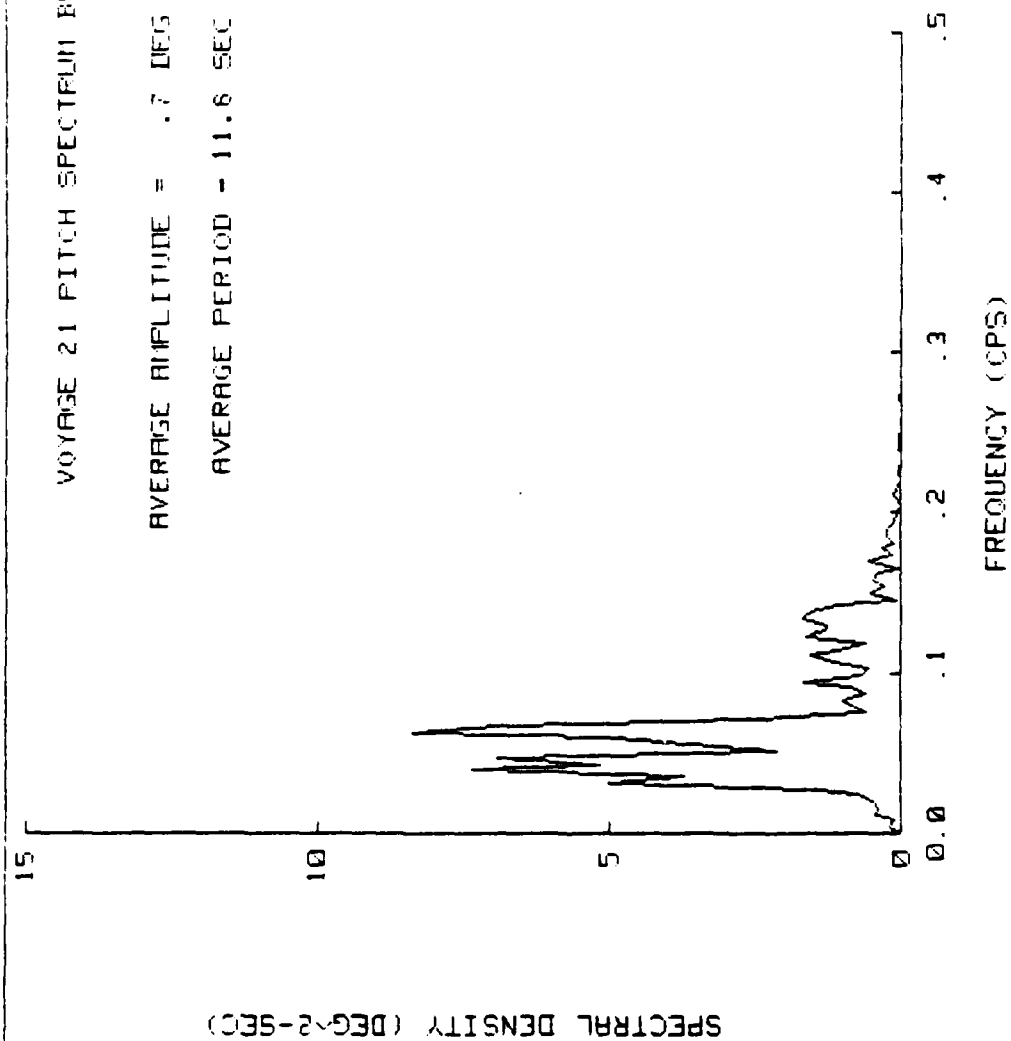


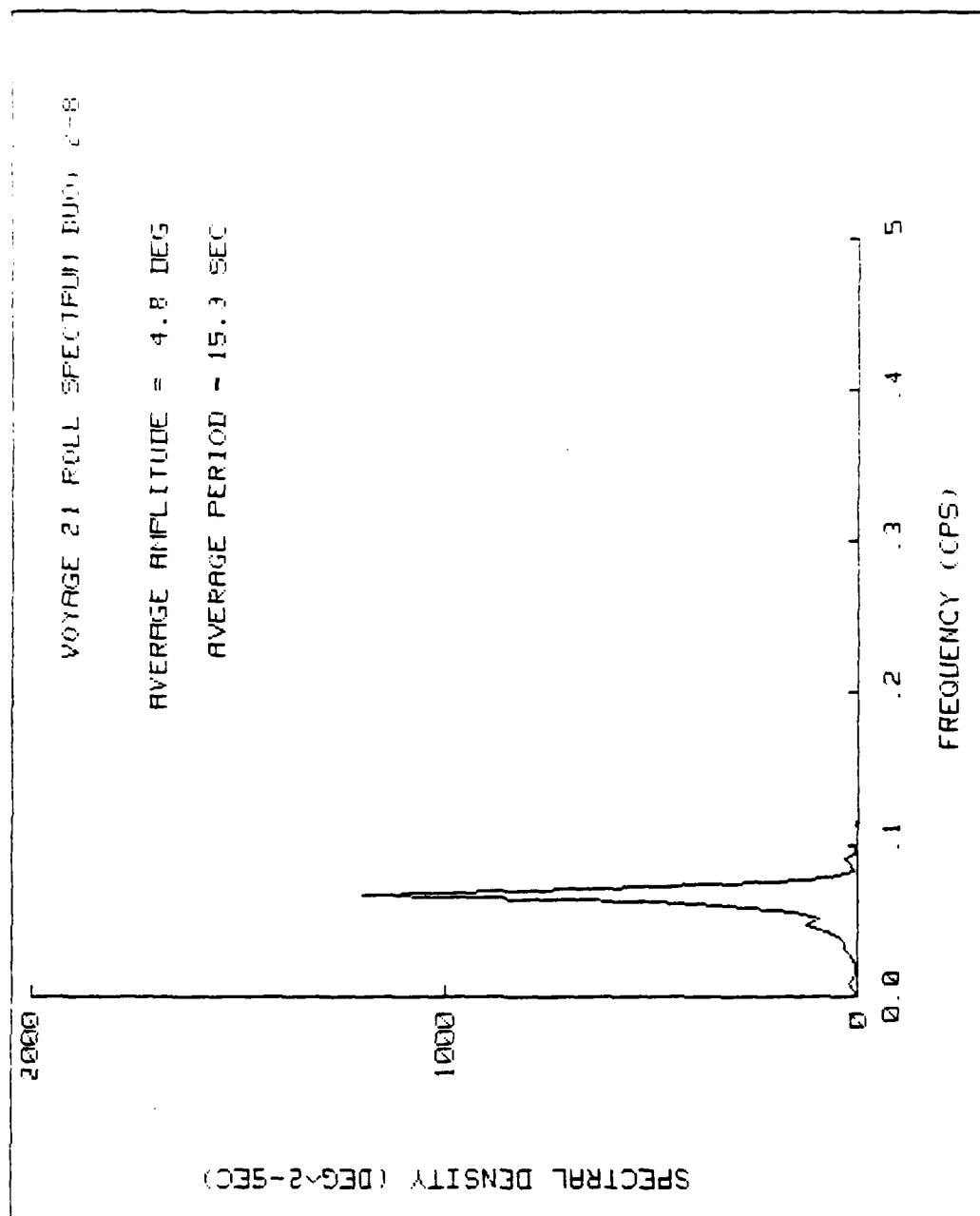


VOYAGE 21 PITCH SPECTRUM BUOY 2-8

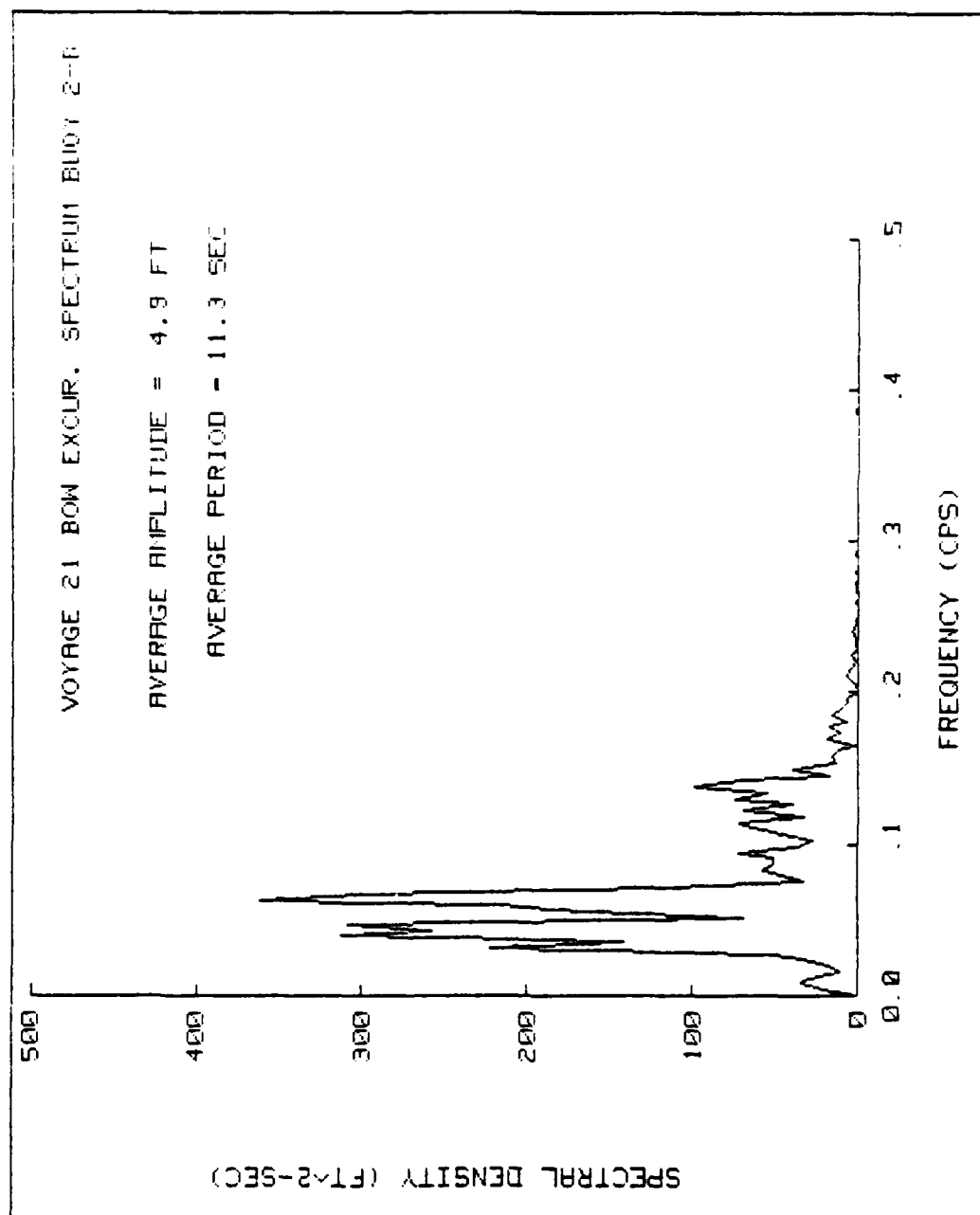
AVERAGE AMPLITUDE = .7 DEG

AVERAGE PERIOD = 11.6 SEC





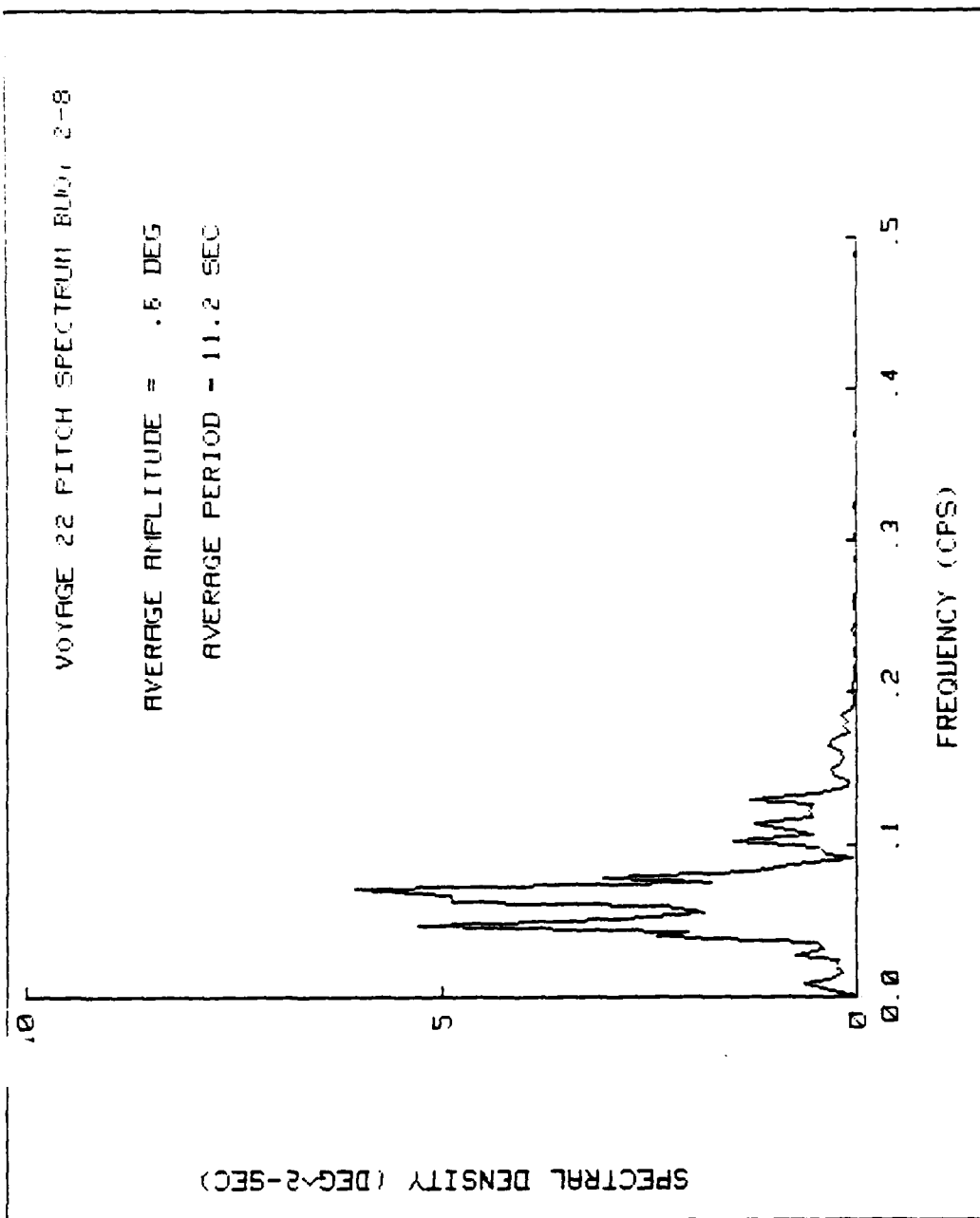




VOYAGE 22 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .6 DEG

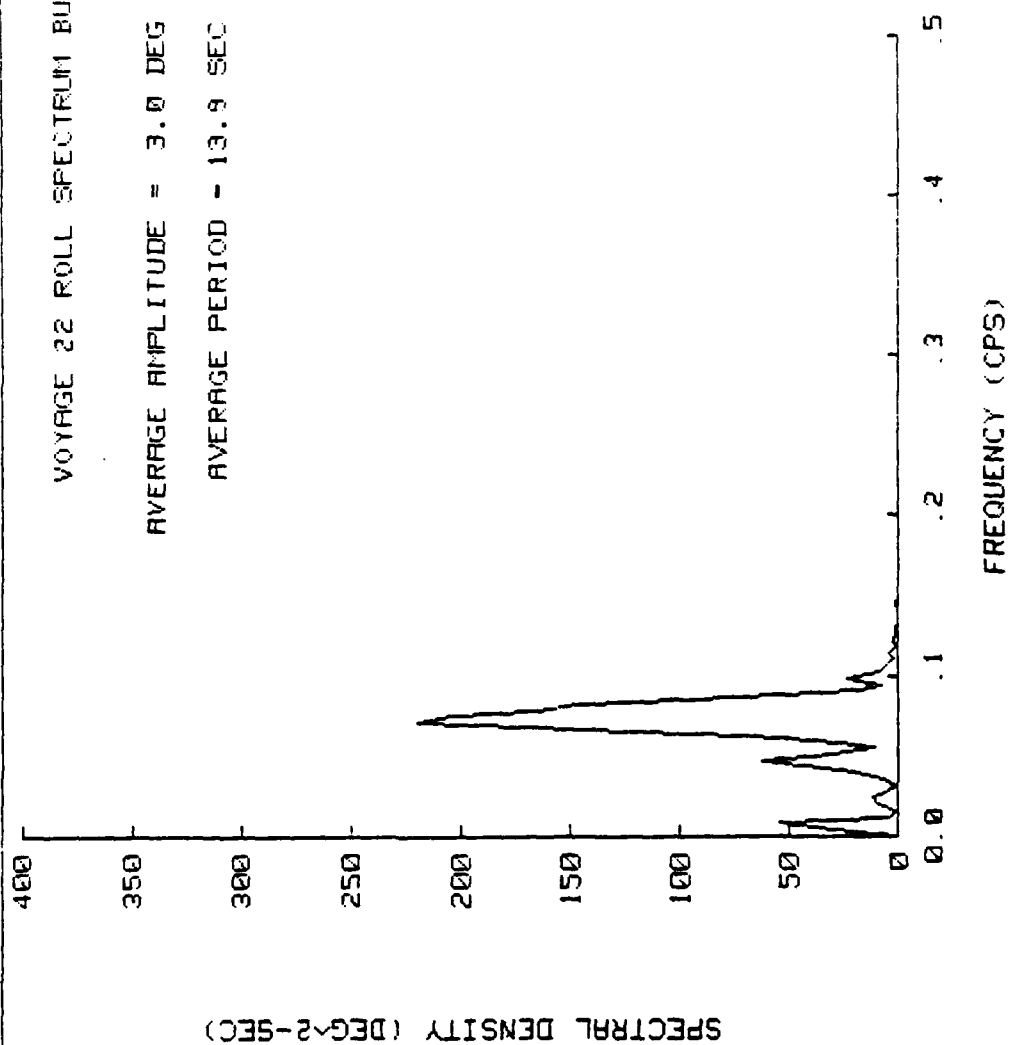
AVERAGE PERIOD = 11.2 SEC

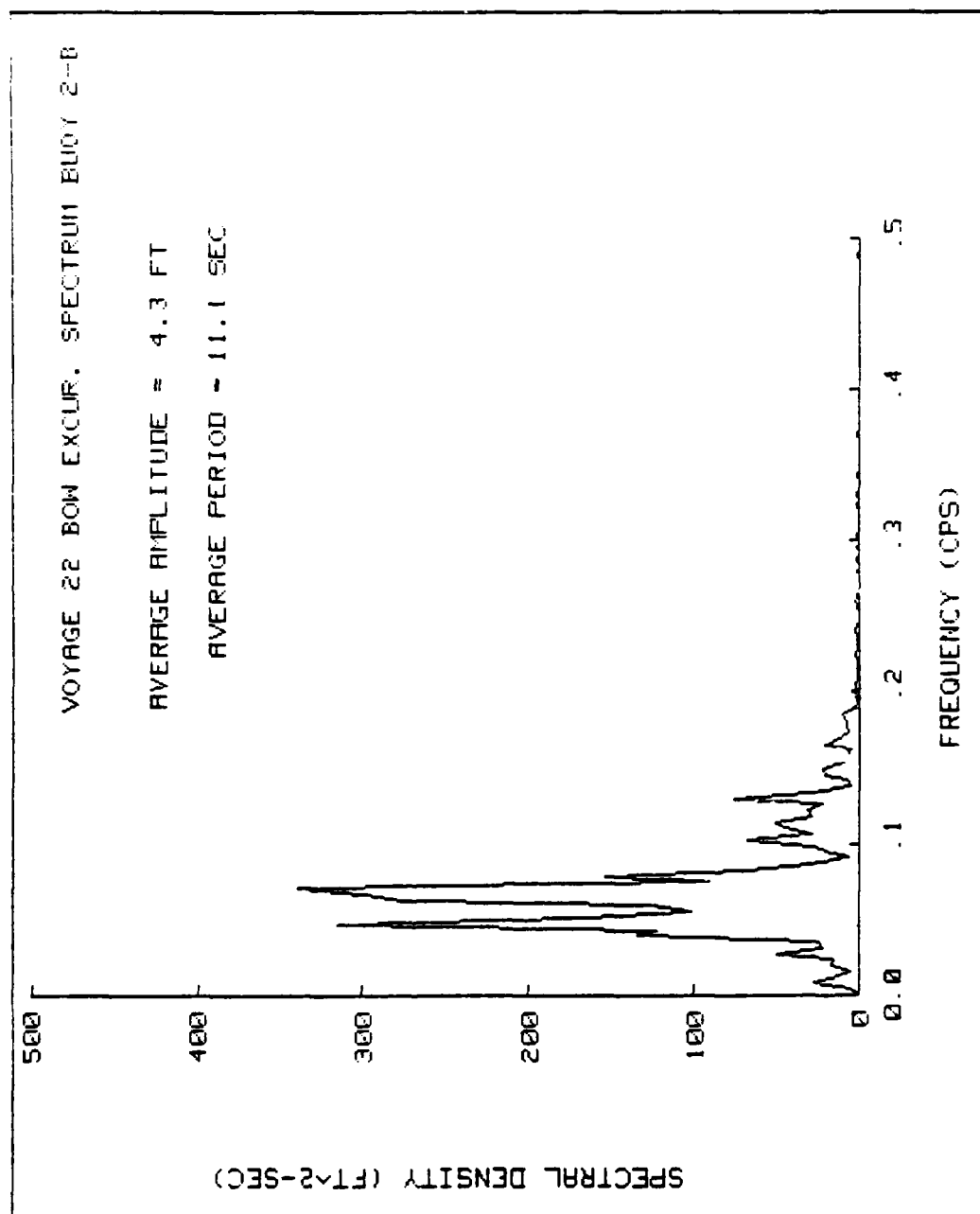


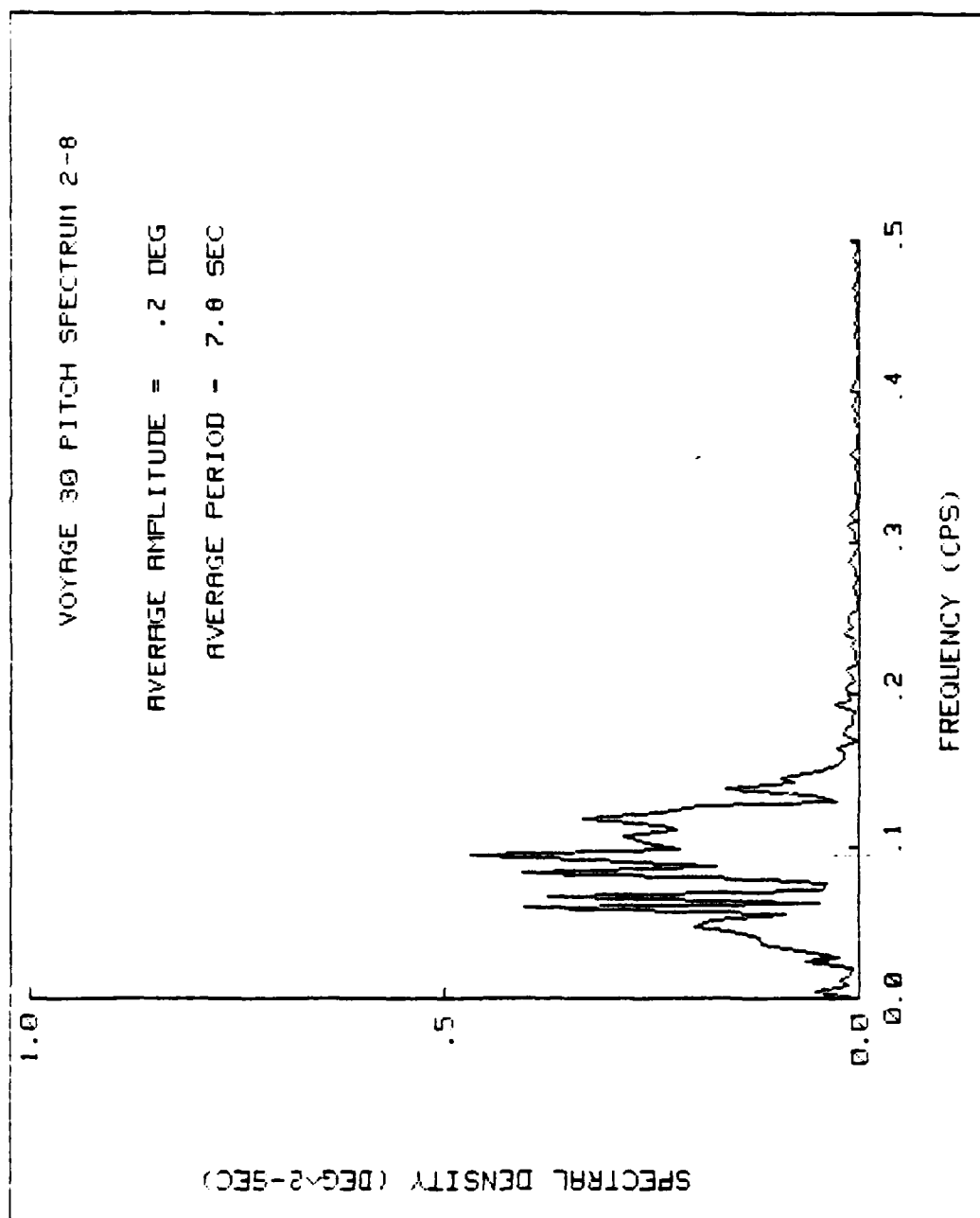
VOYAGE 22 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 3.0 DEG

AVERAGE PERIOD = 13.9 SEC



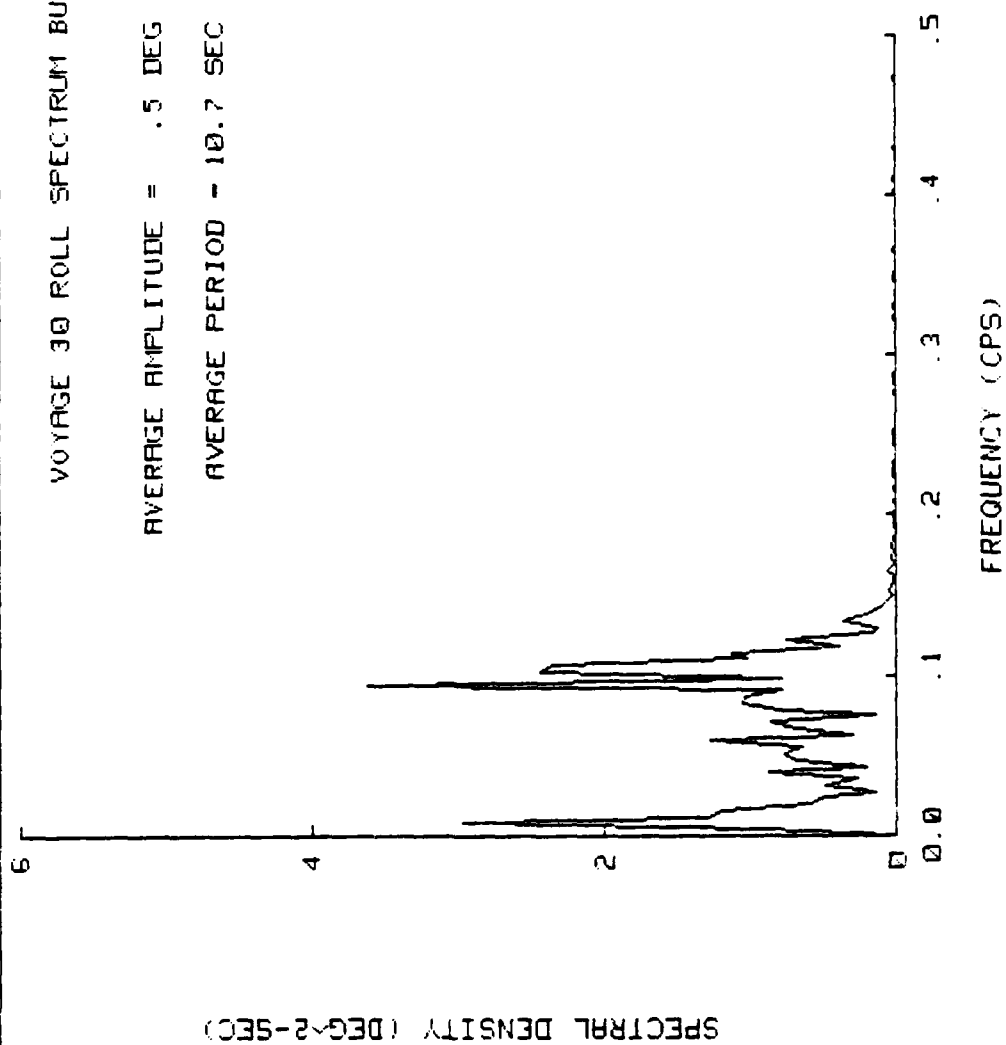




VOYAGE 30 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

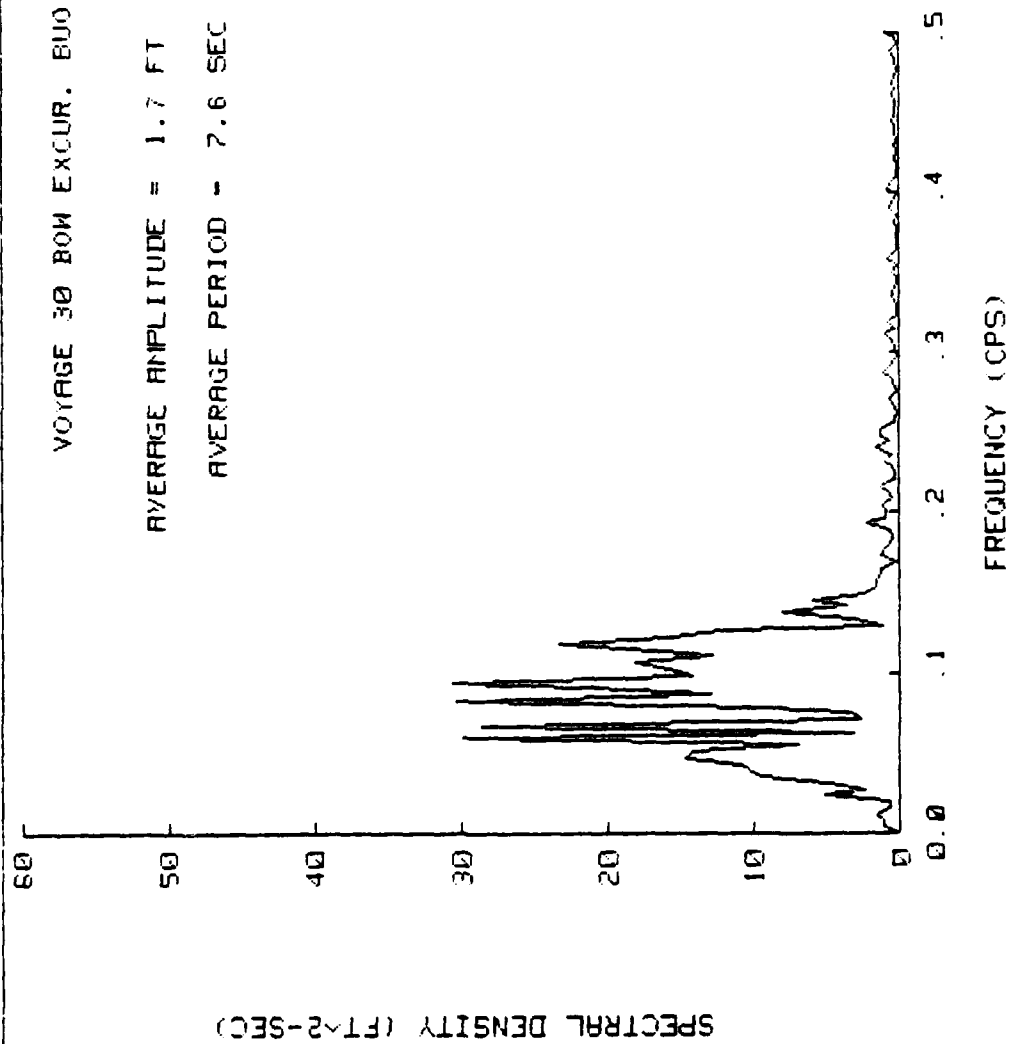
AVERAGE PERIOD = 10.7 SEC

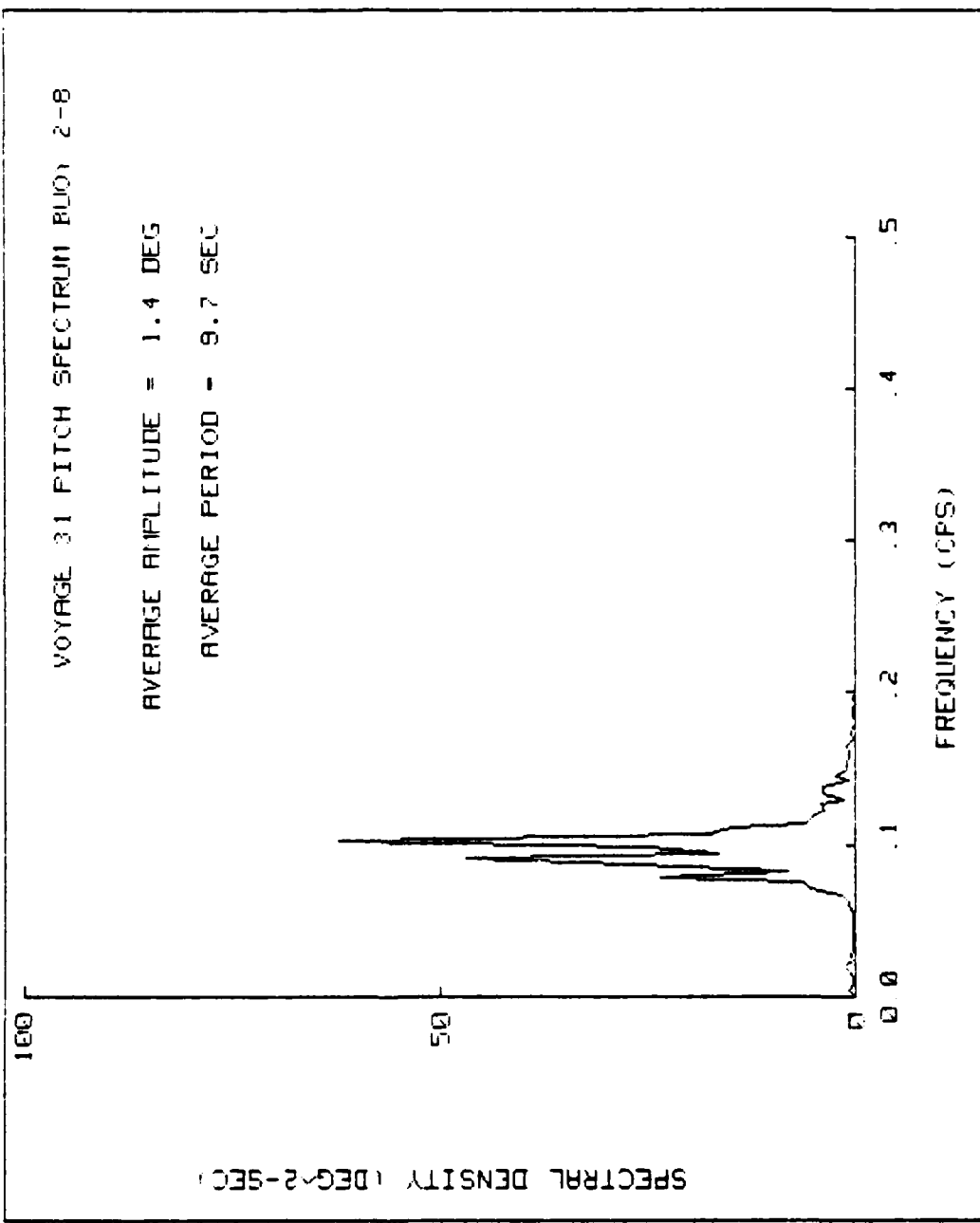


VOYAGE 30 BOW EXCUR. BU01 2-8

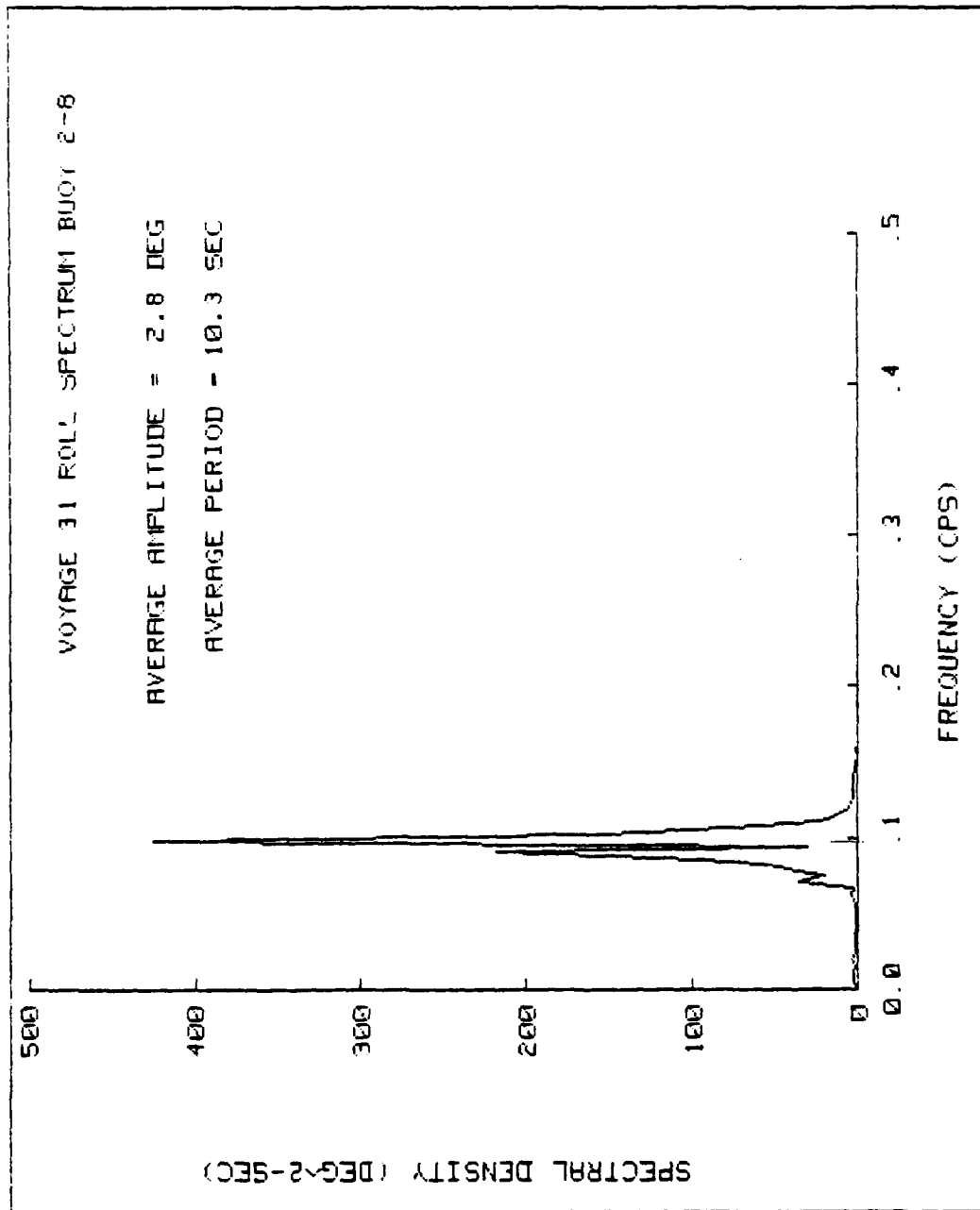
AVERAGE AMPLITUDE = 1.7 FT

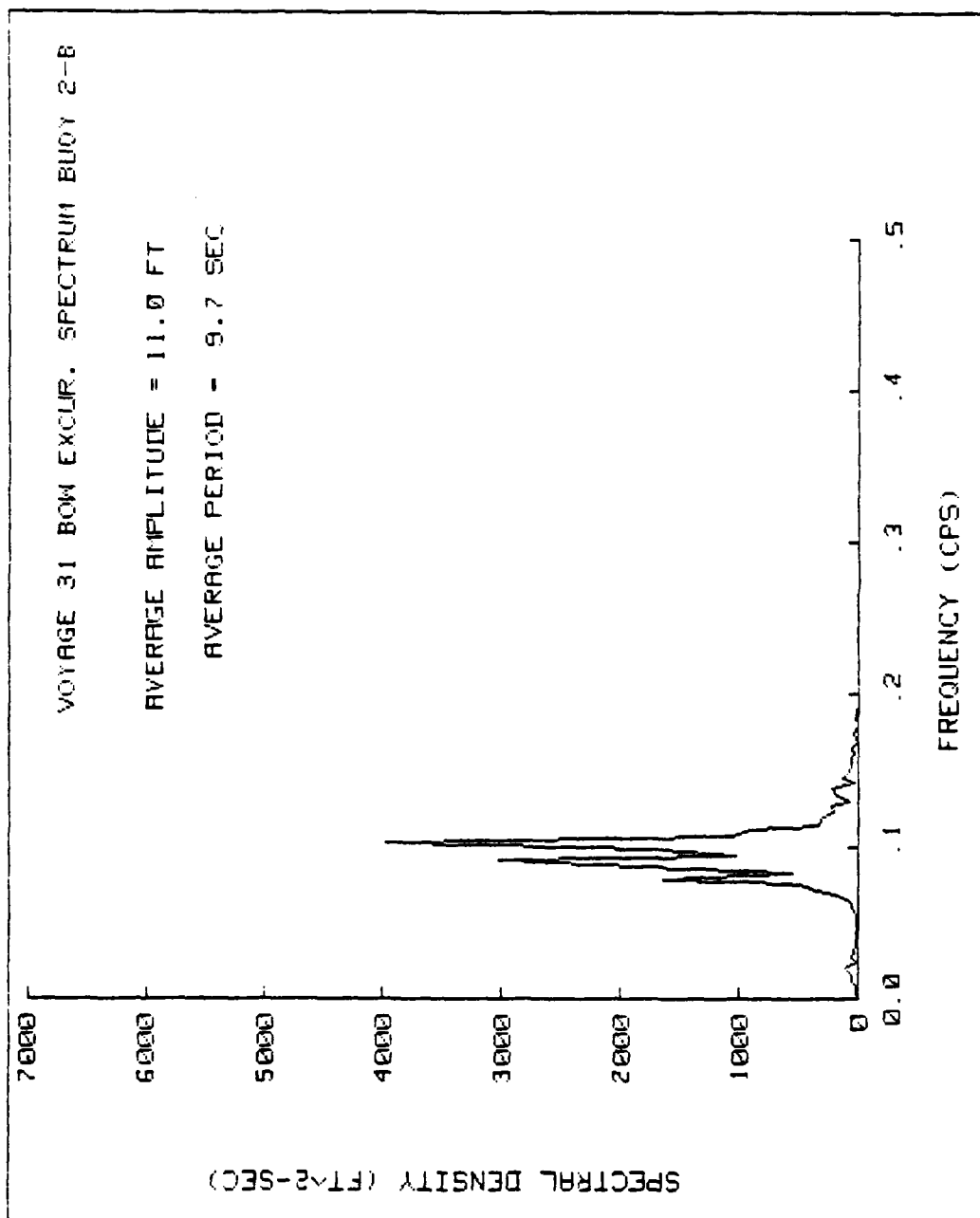
AVERAGE PERIOD = 7.6 SEC

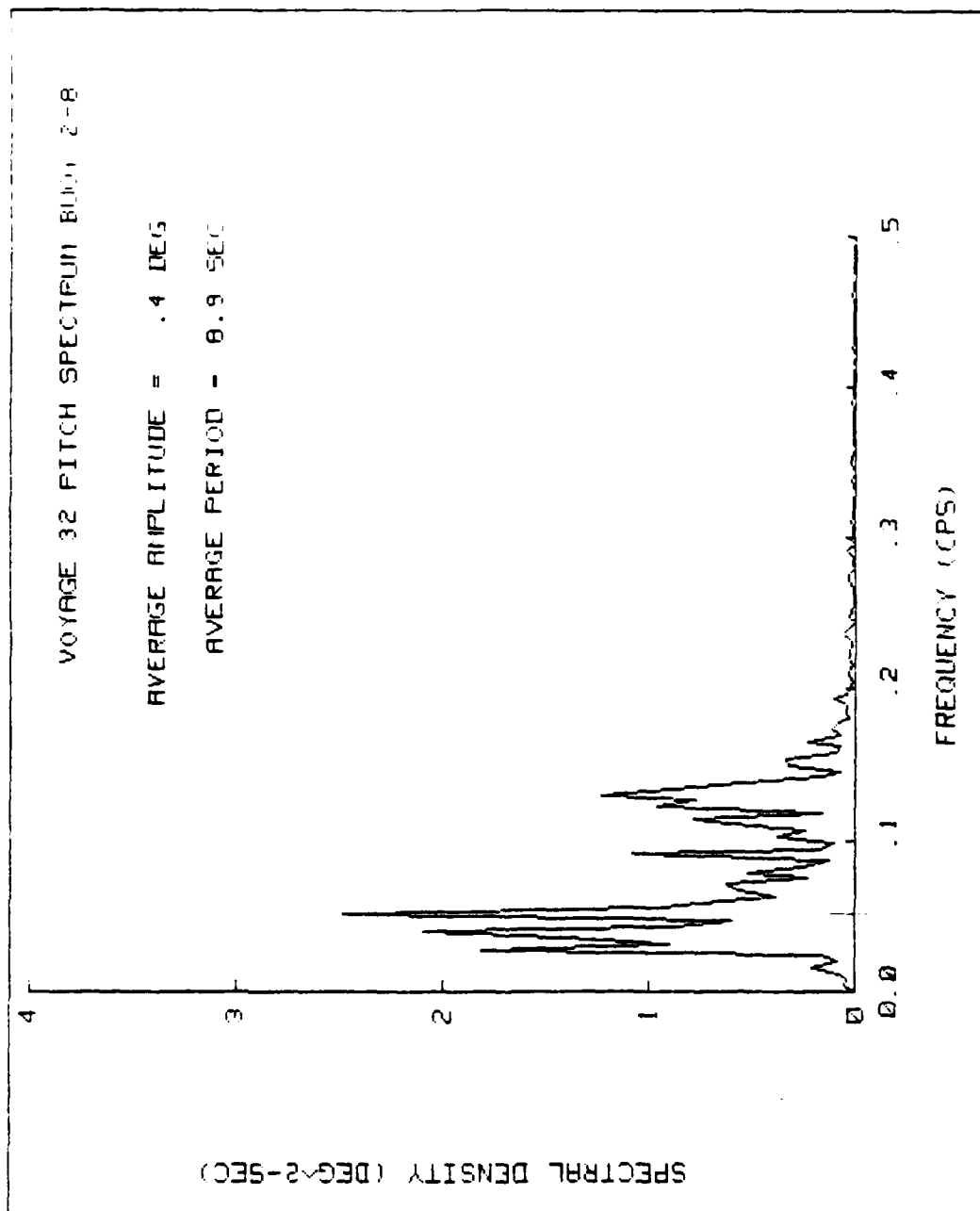


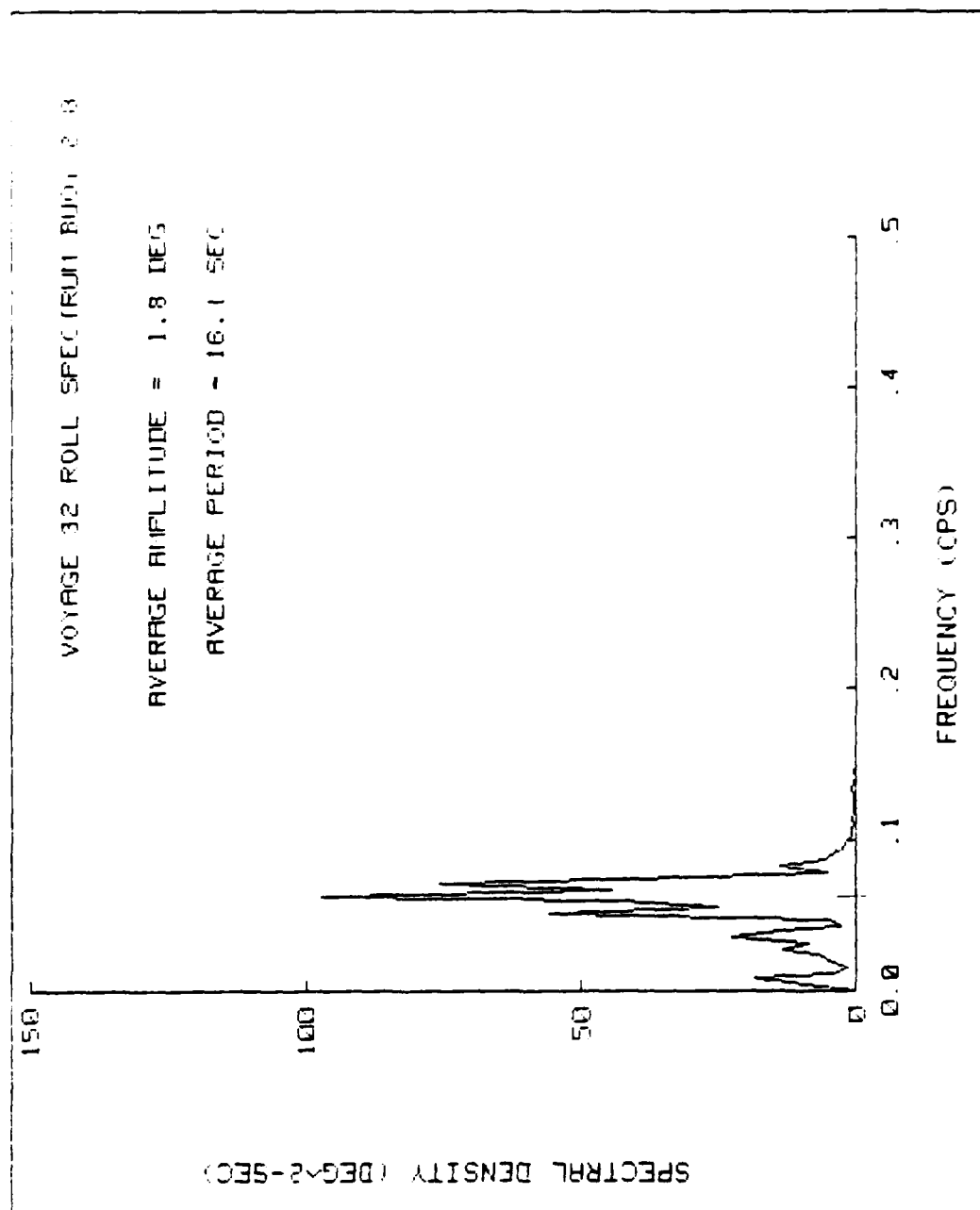


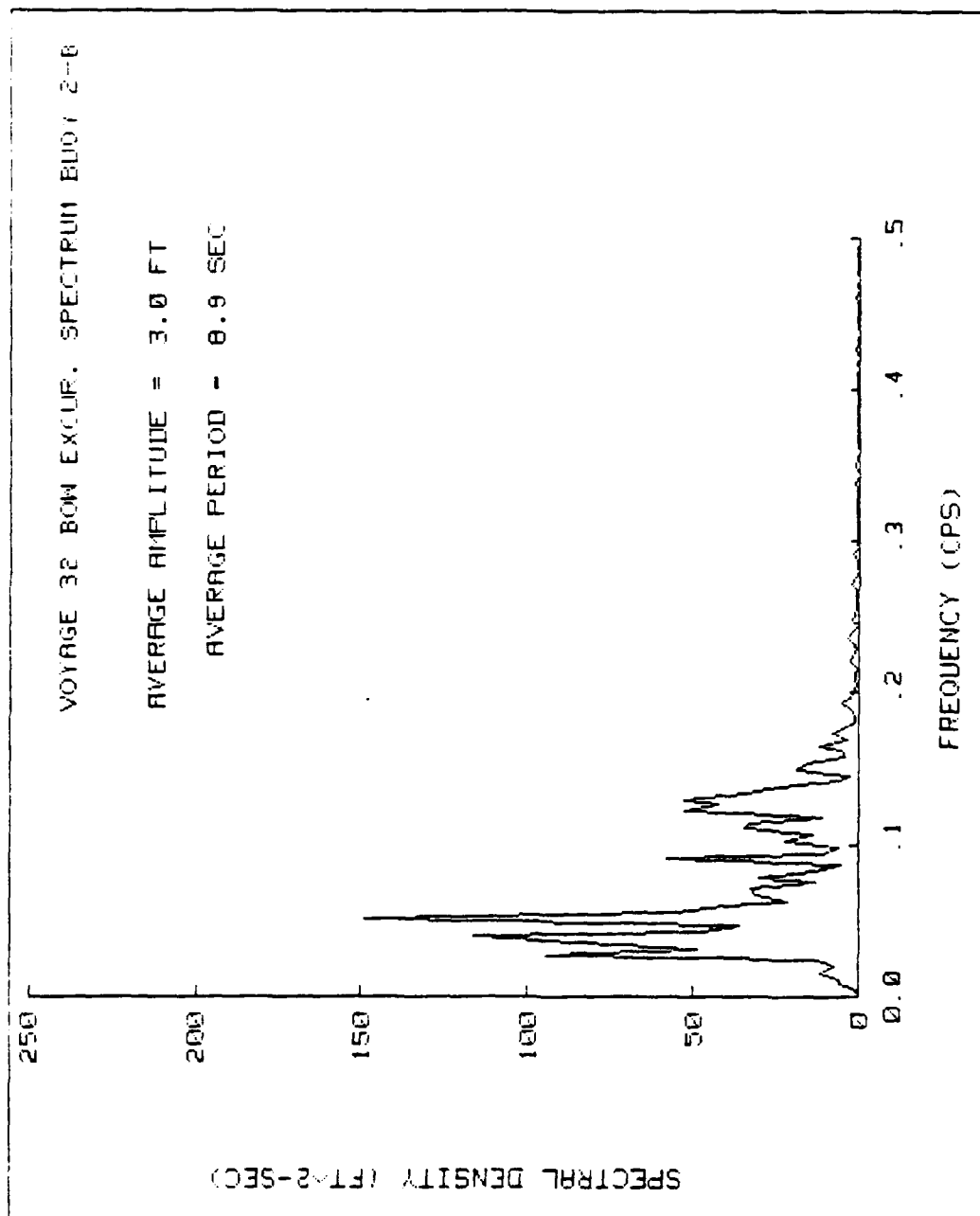








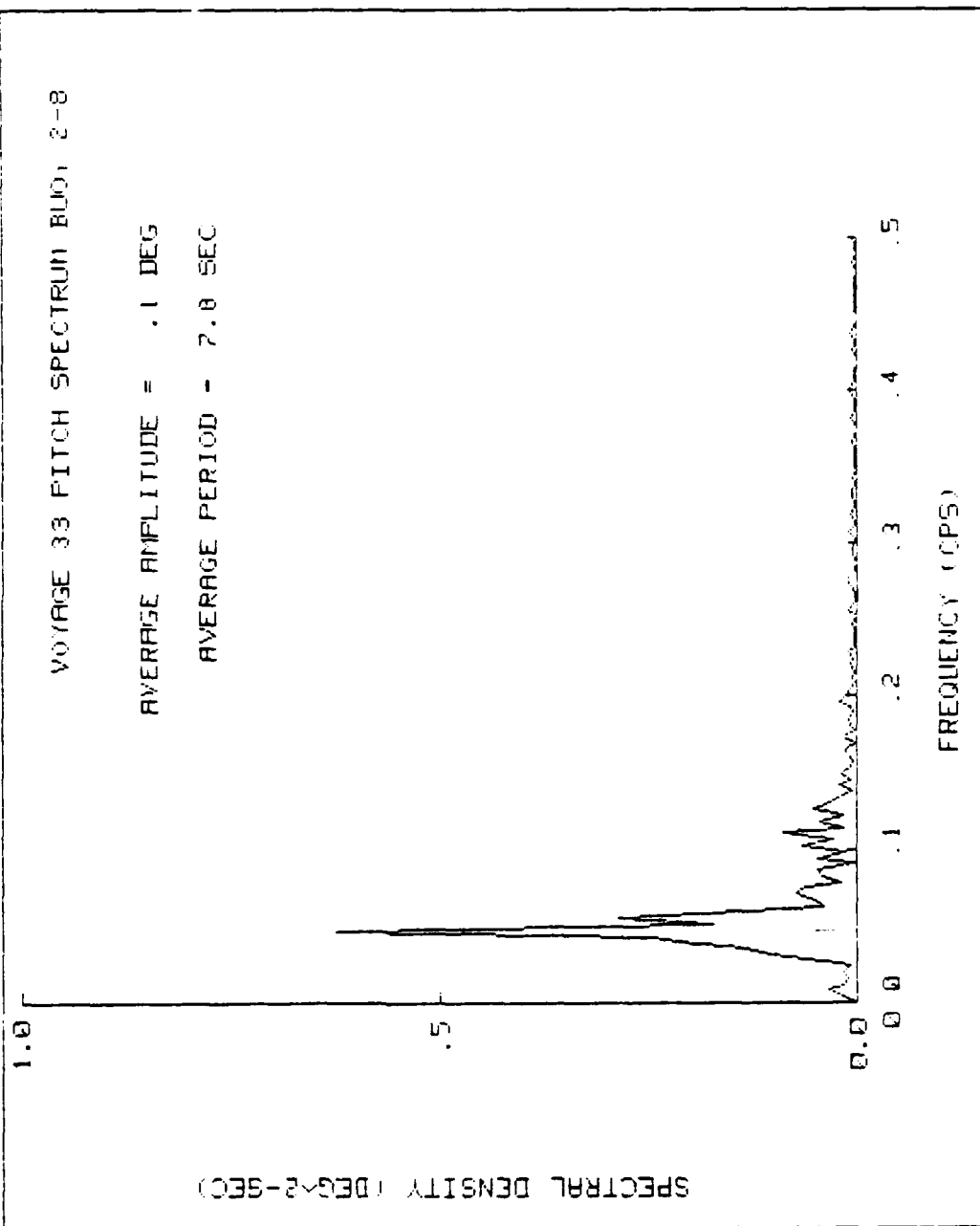


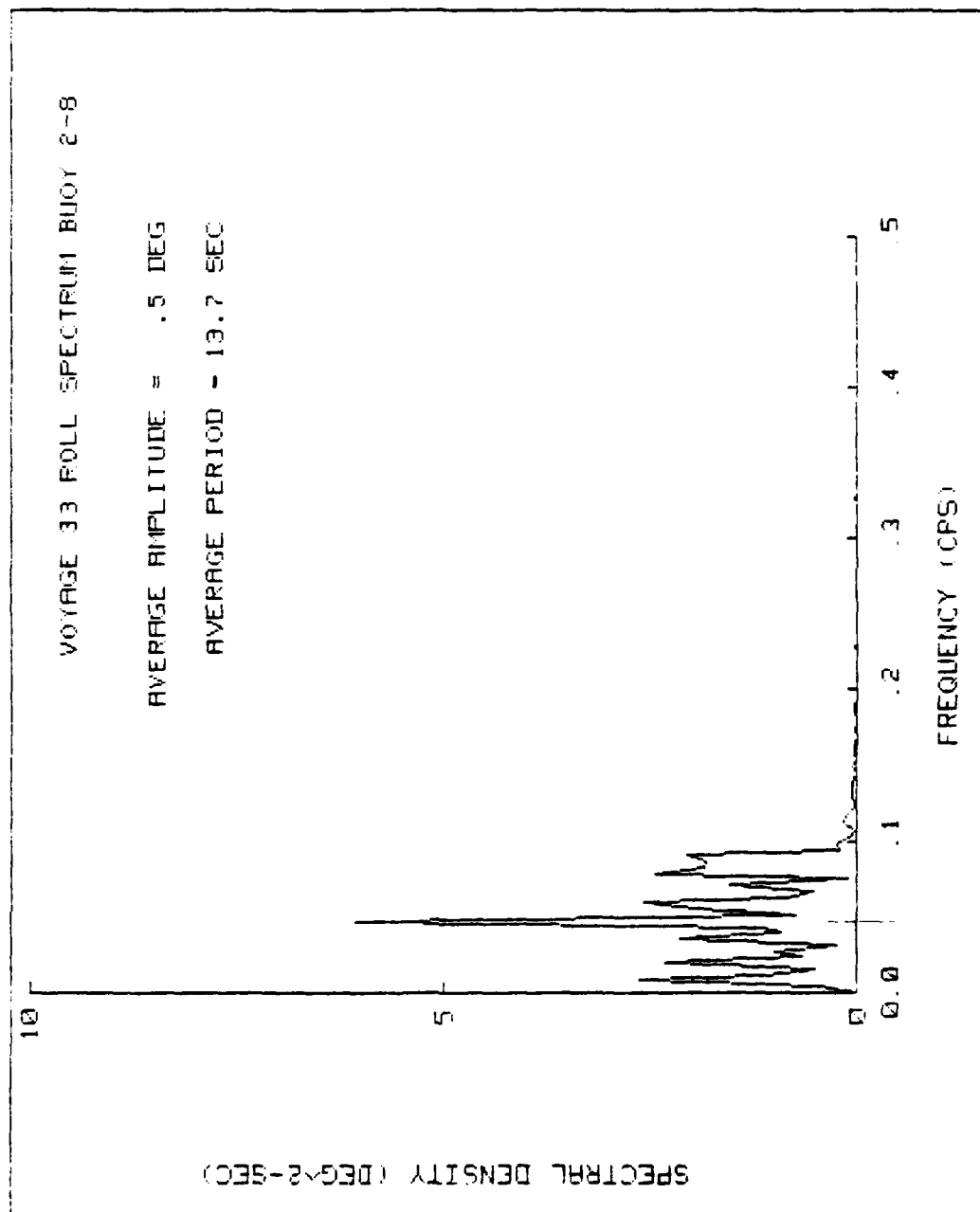


VOYAGE 33 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .1 DEG

AVERAGE PERIOD = 7.0 SEC

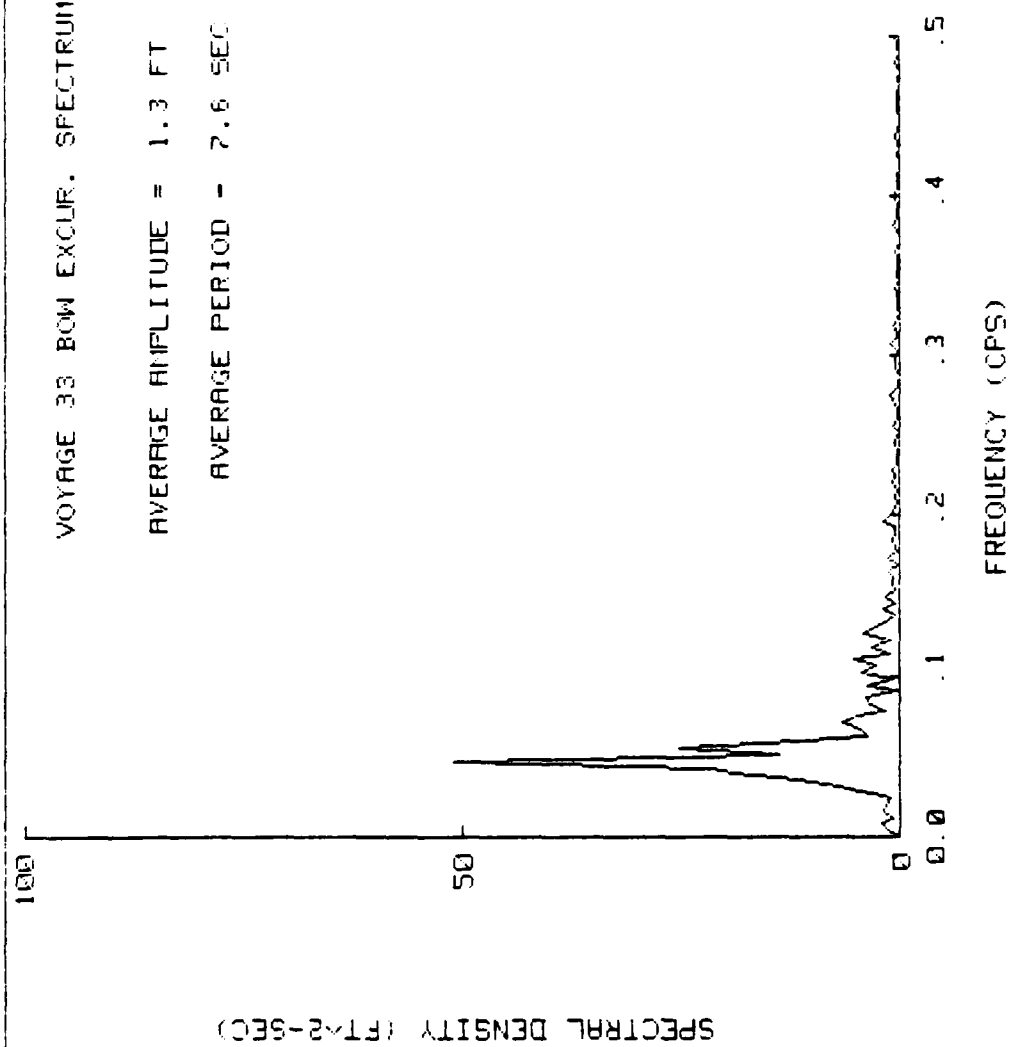




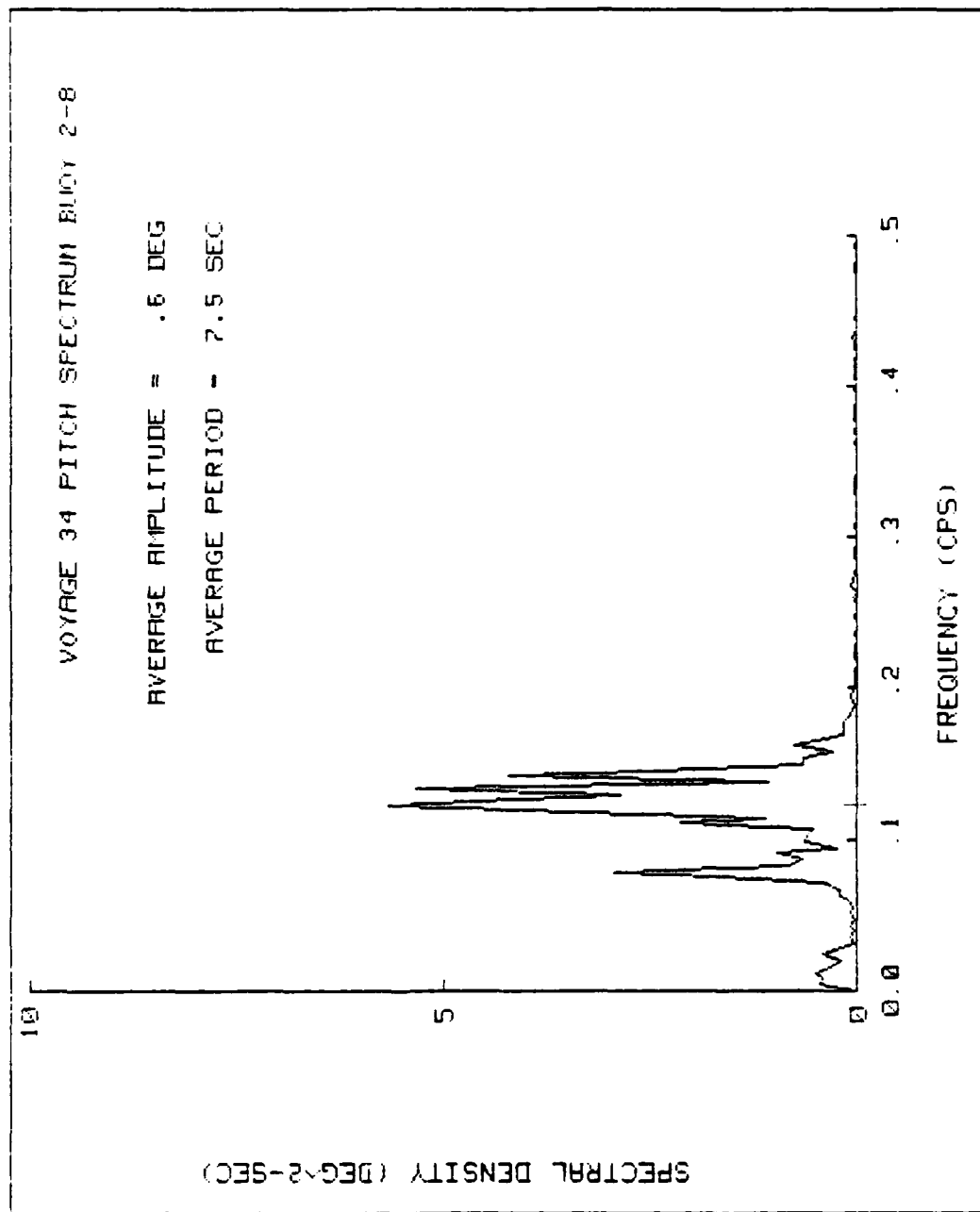
VOYAGE 33 BOW EXCUR. SPECTRUM BUOY 2-B

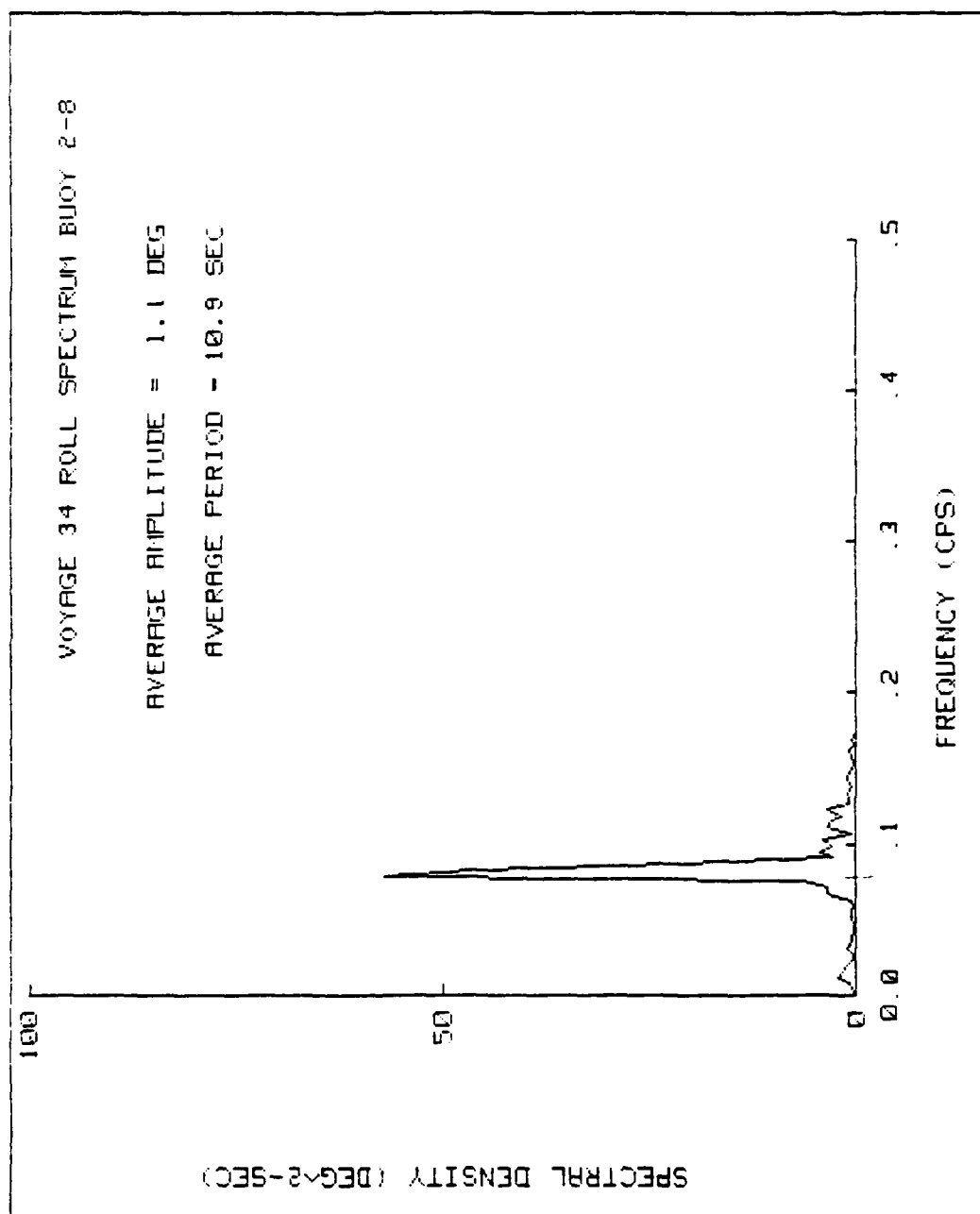
AVERAGE AMPLITUDE = 1.3 FT

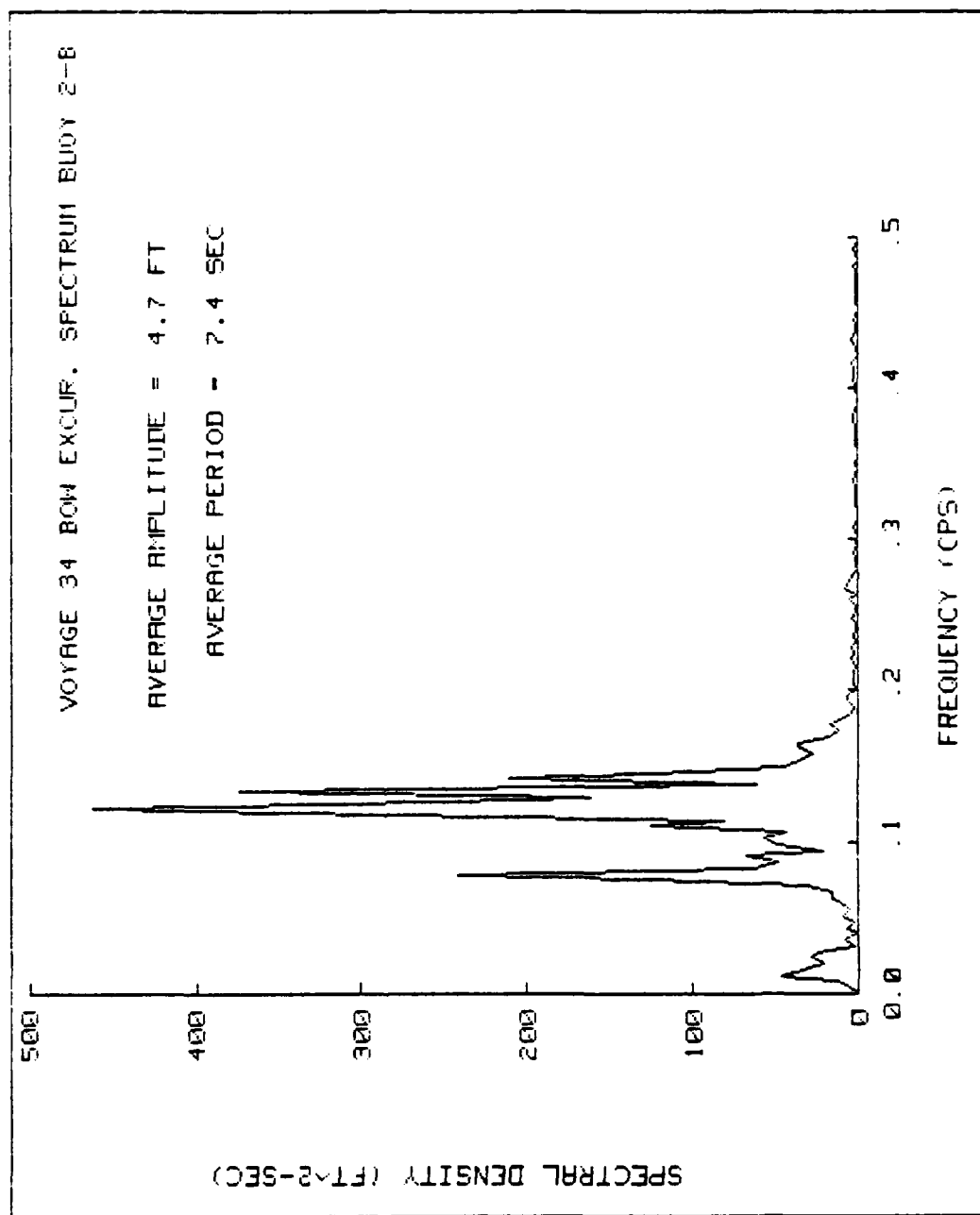
AVERAGE PERIOD = 7.6 SEC







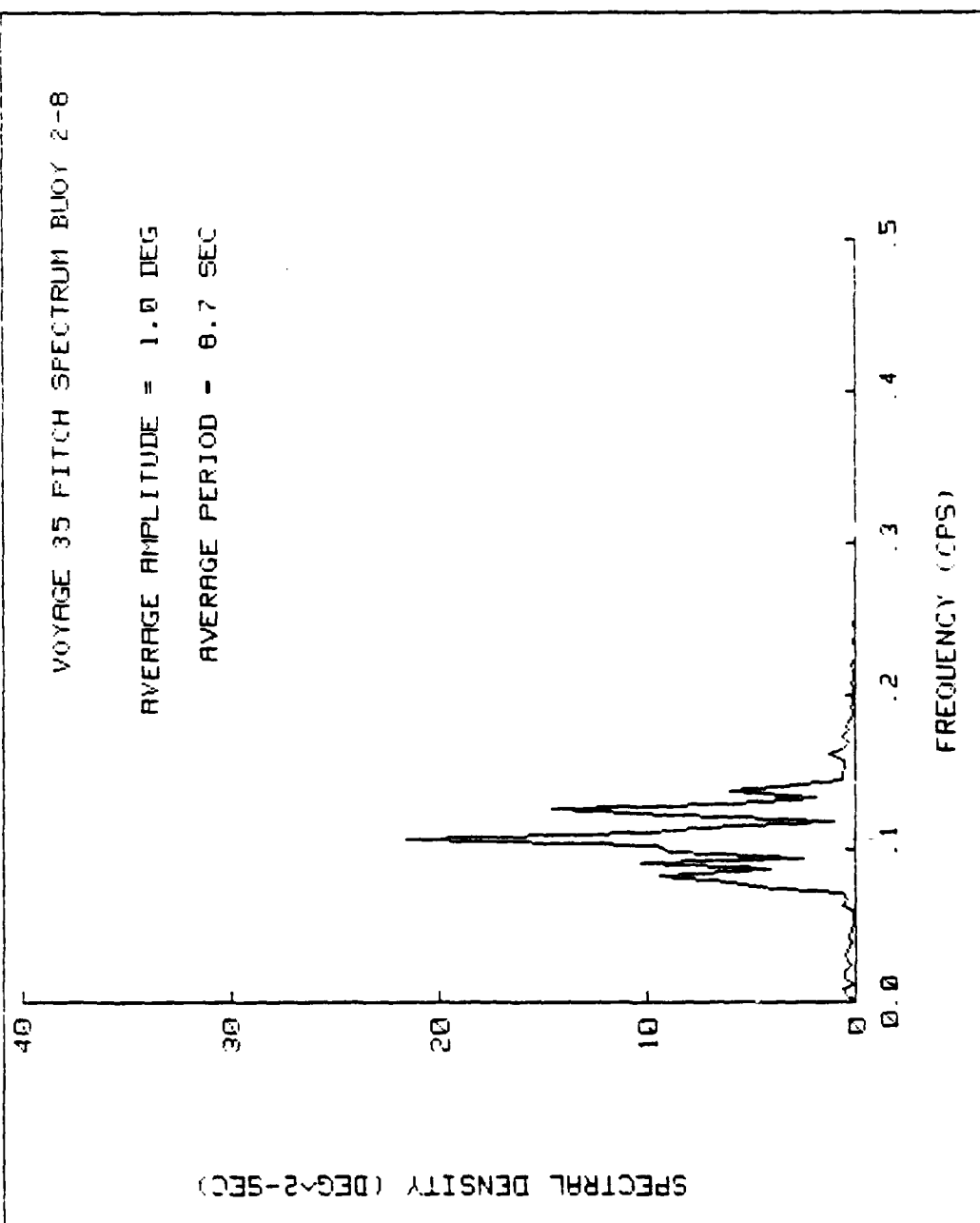




VOYAGE 35 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 1.0 DEG

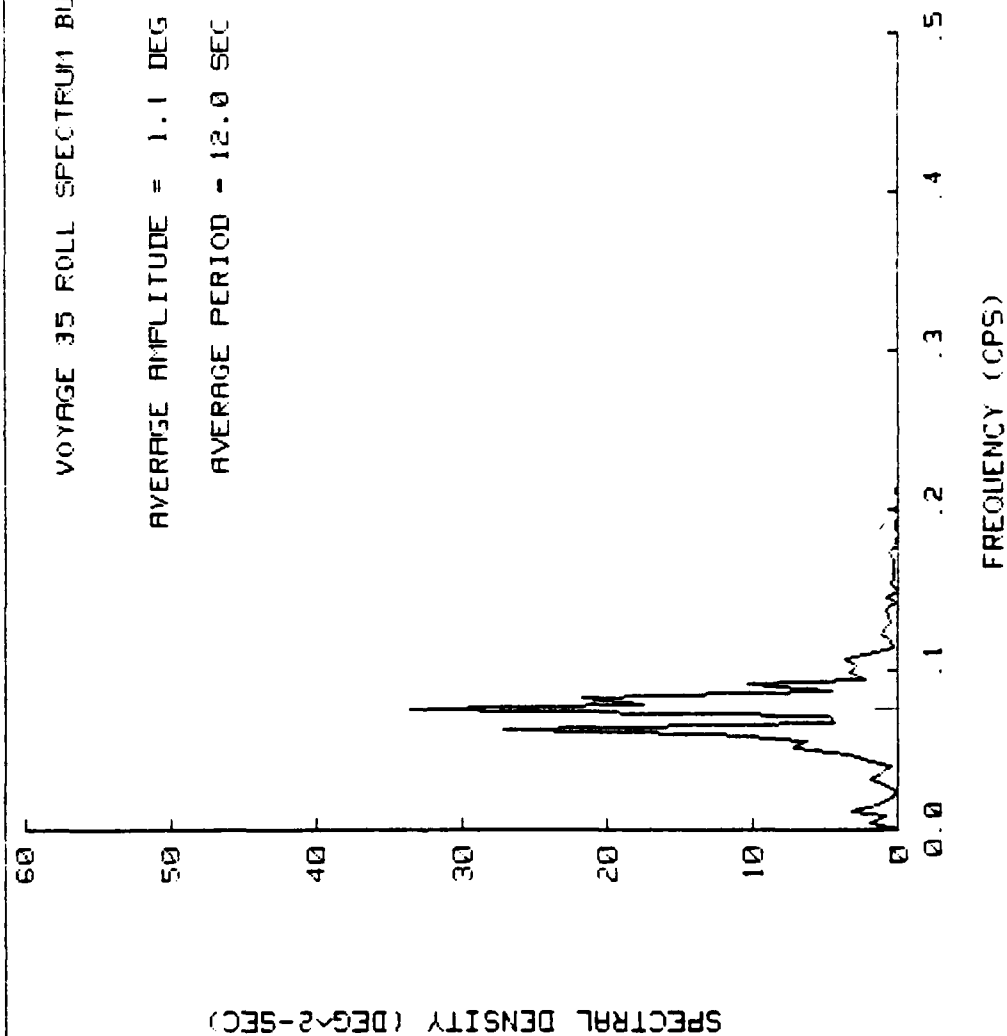
AVERAGE PERIOD = 0.7 SEC

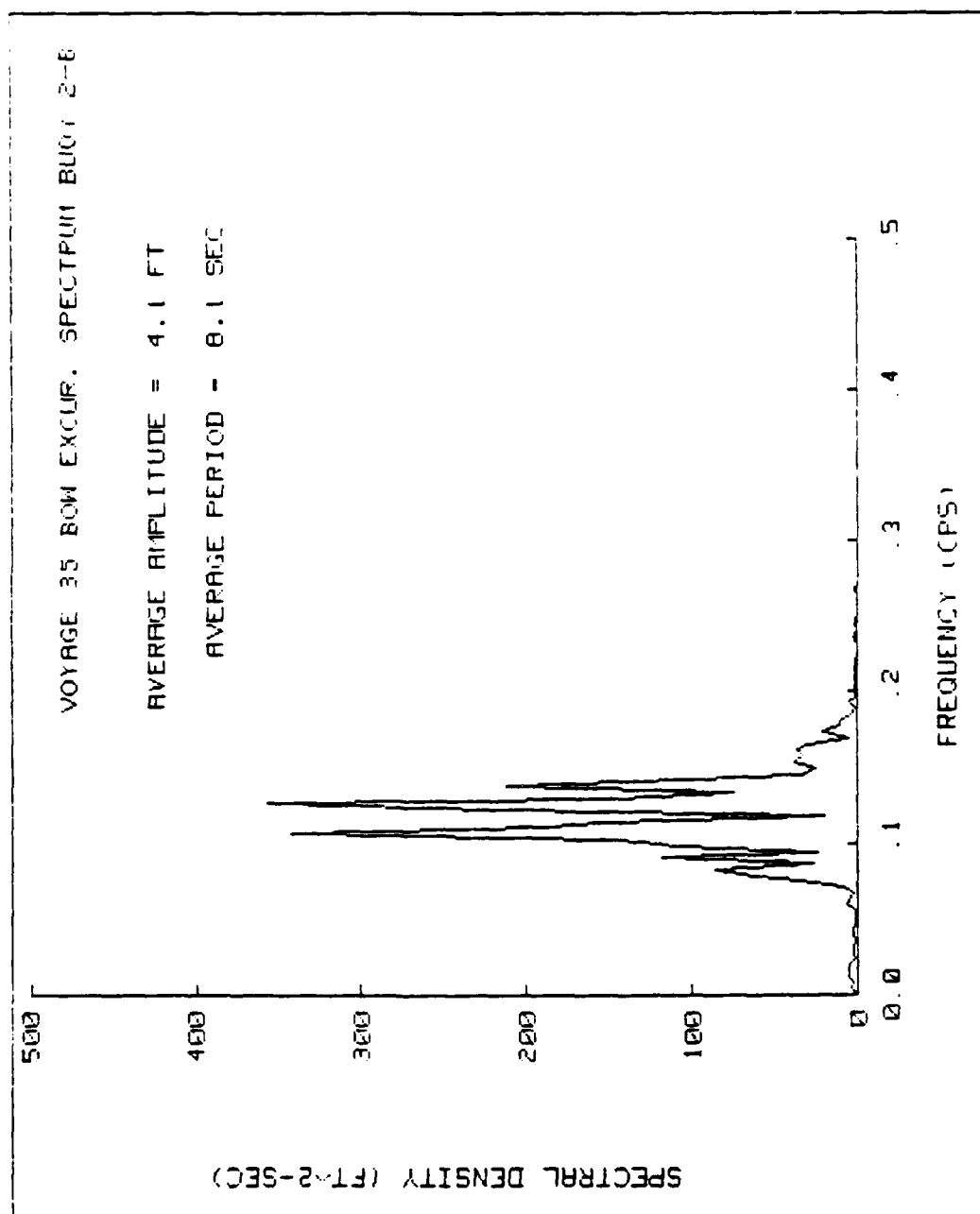


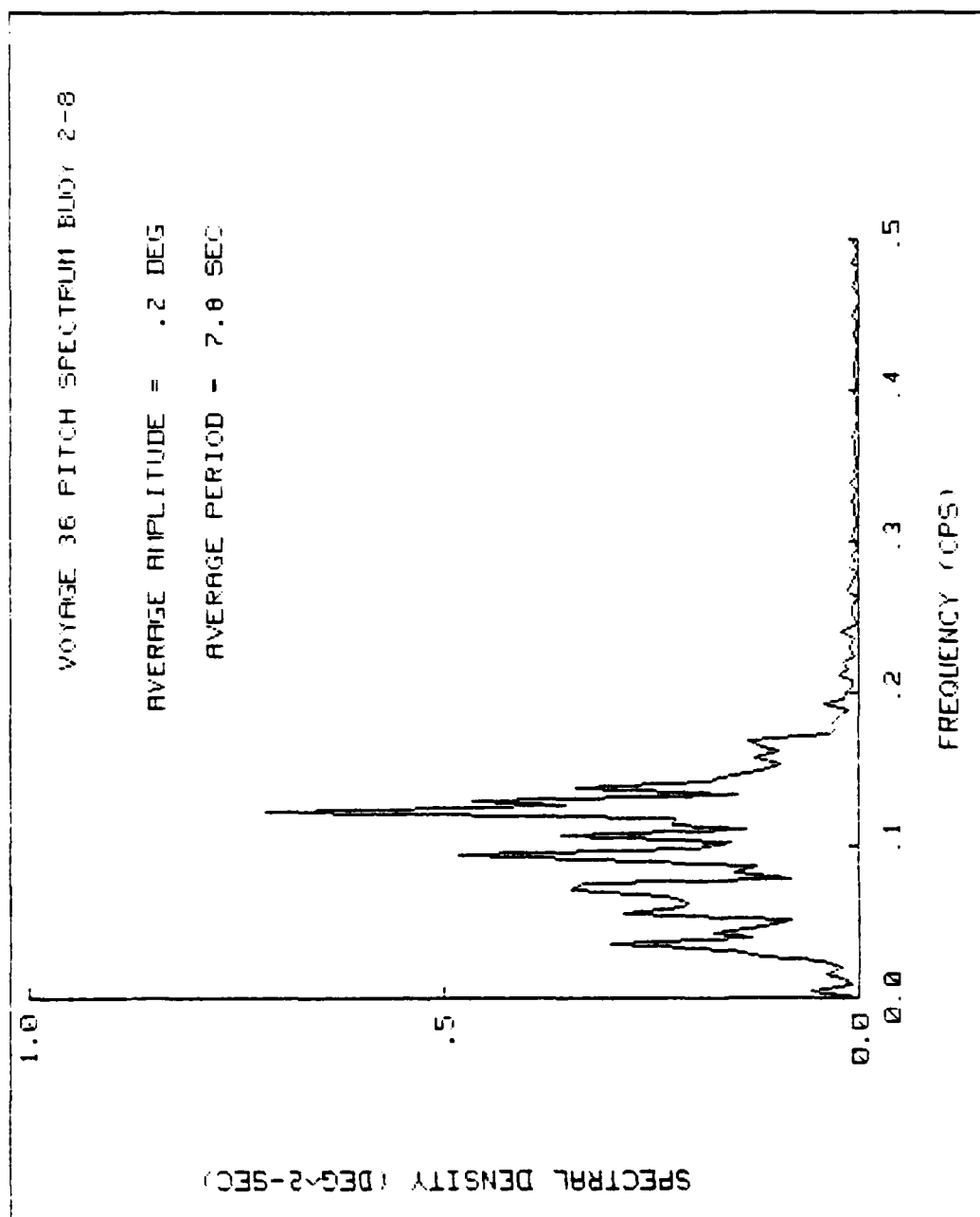
VOYAGE 35 ROLL SPECTRUM BUOY 2-8

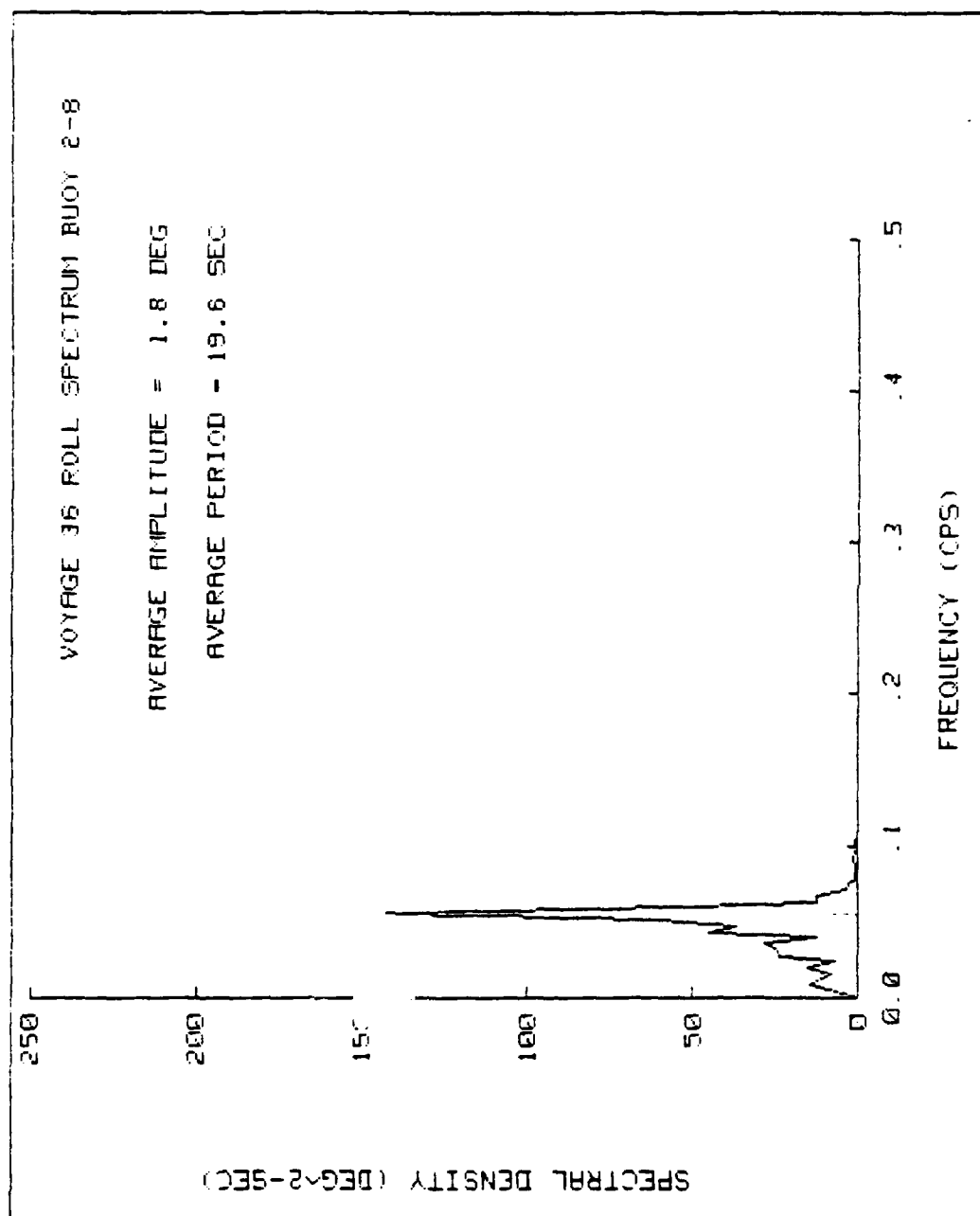
AVERAGE AMPLITUDE = 1.1 DEG

AVERAGE PERIOD = 12.0 SEC

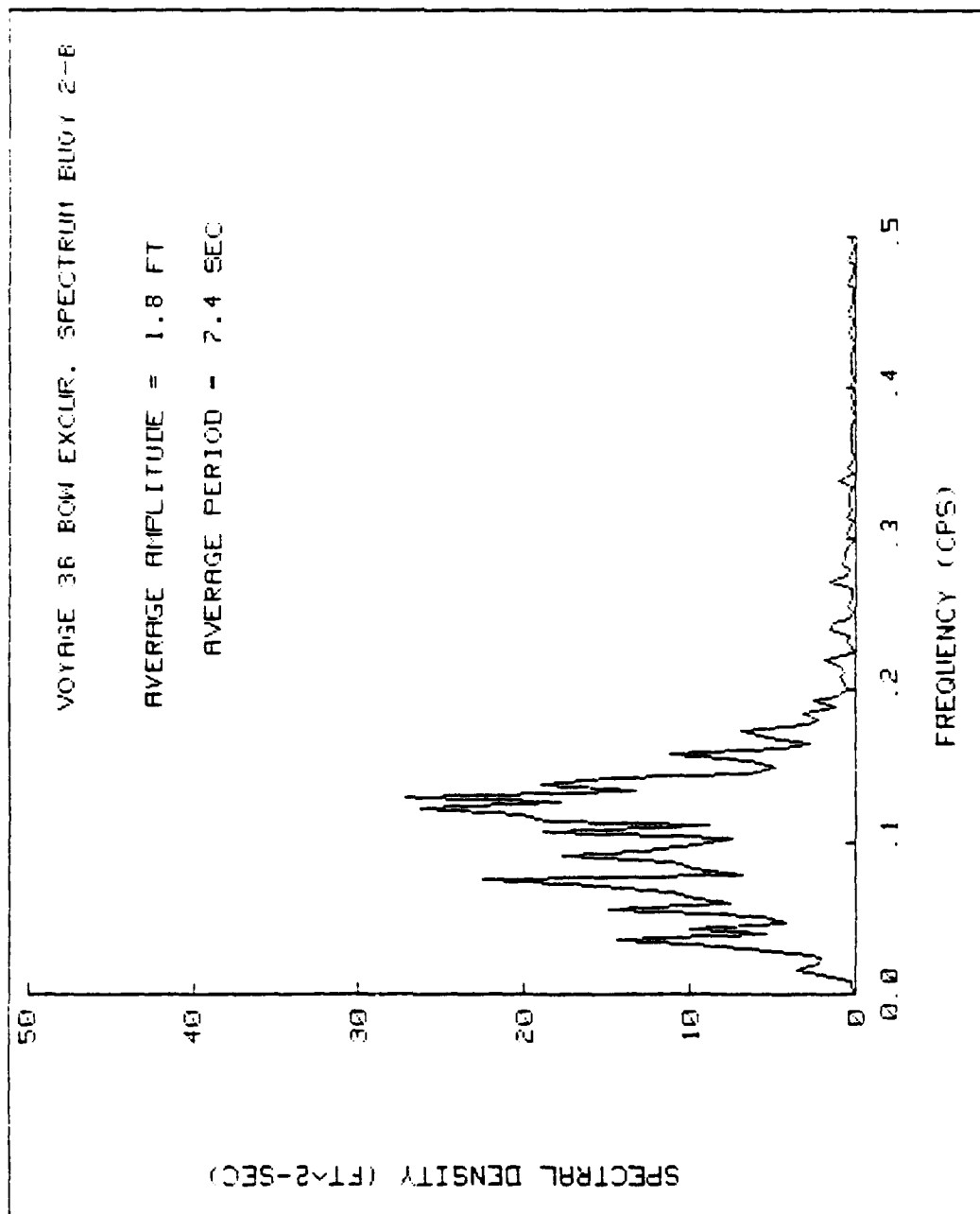


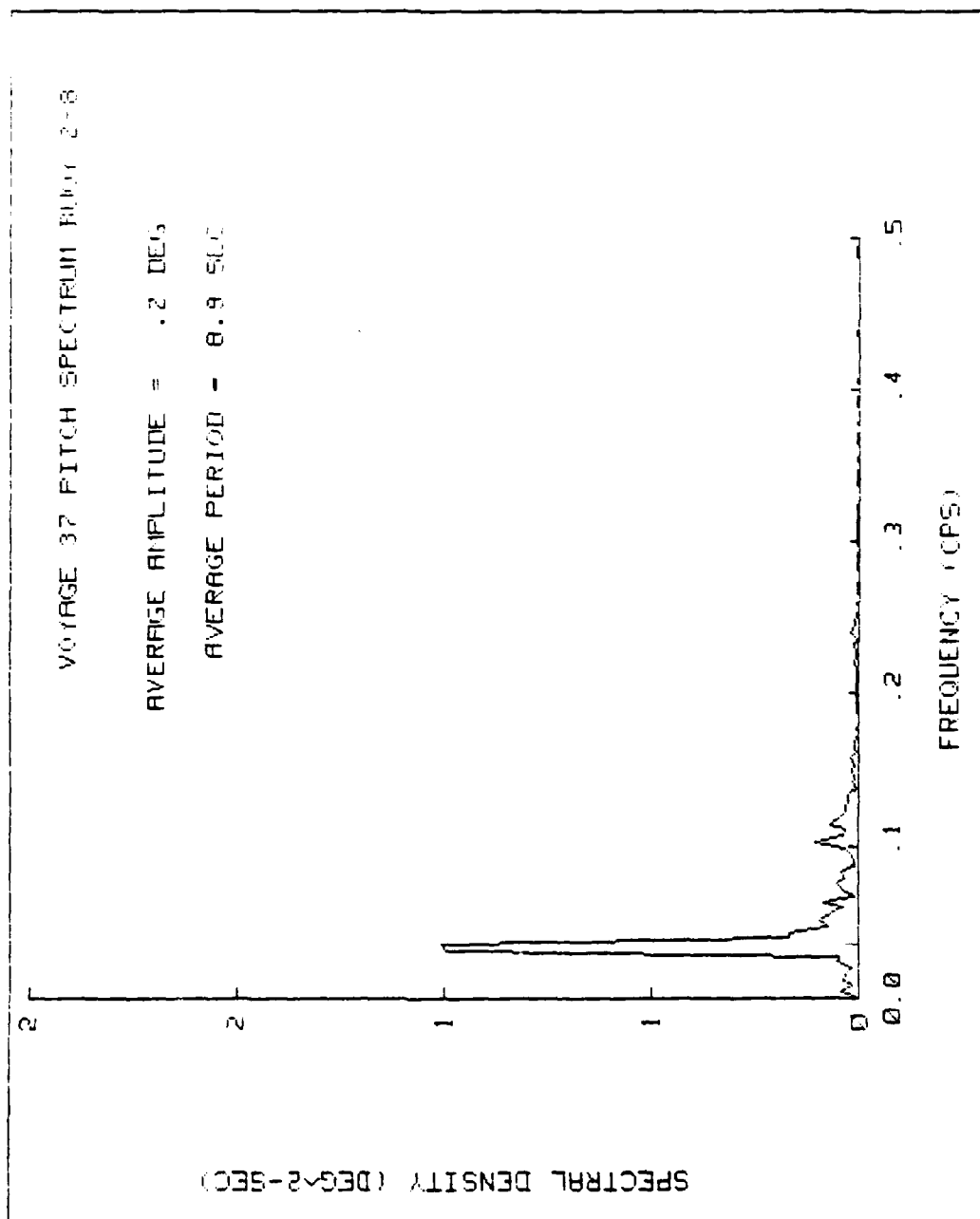








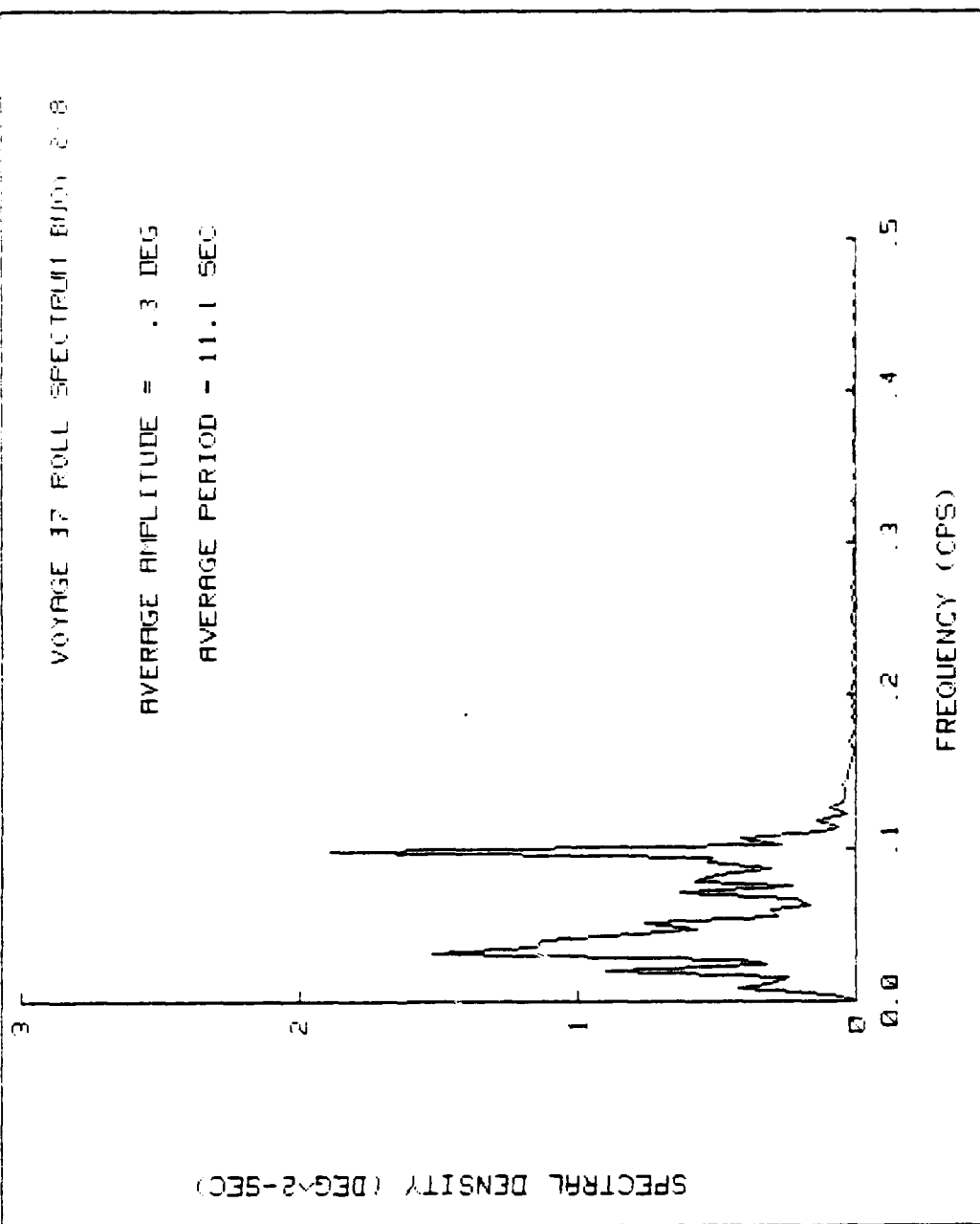


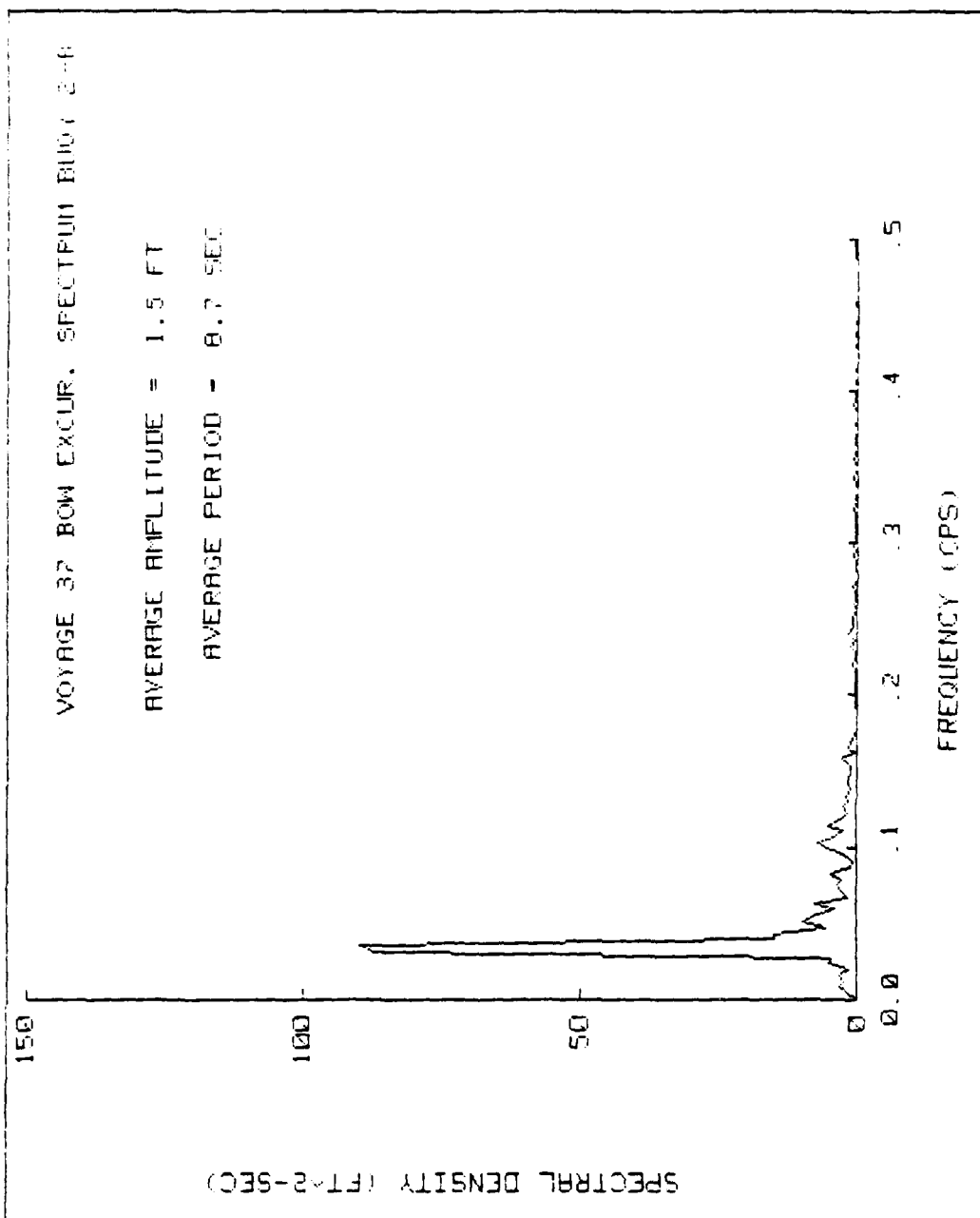


VOYAGE 17 ROLL SPECTRUM BUDD 2-8

AVERAGE AMPLITUDE = .3 DEG

AVERAGE PERIOD = 11.1 SEC

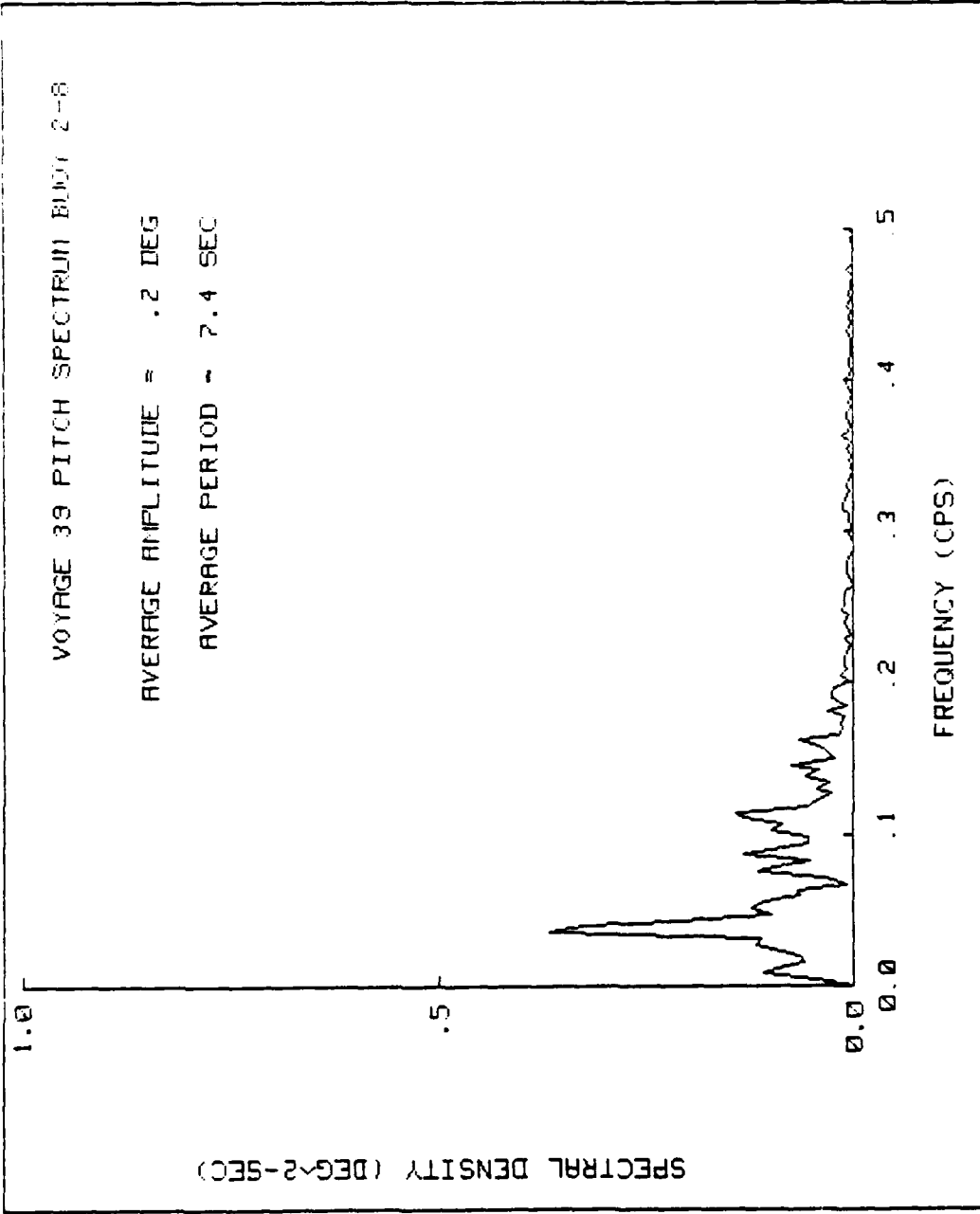


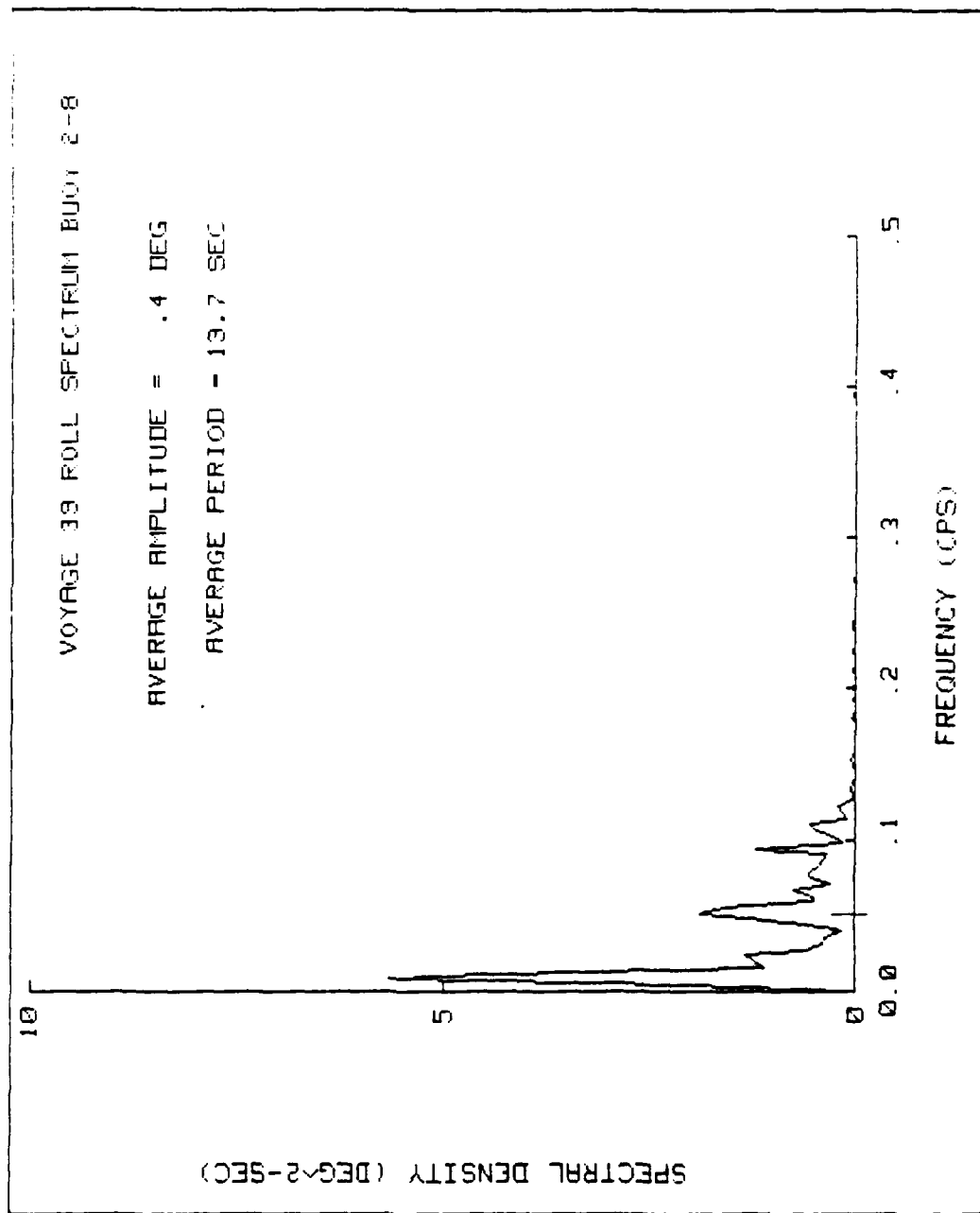


VOYAGE 39 PITCH SPECTRUM BUDY 2-8

AVERAGE AMPLITUDE = .2 DEG

AVERAGE PERIOD = 7.4 SEC

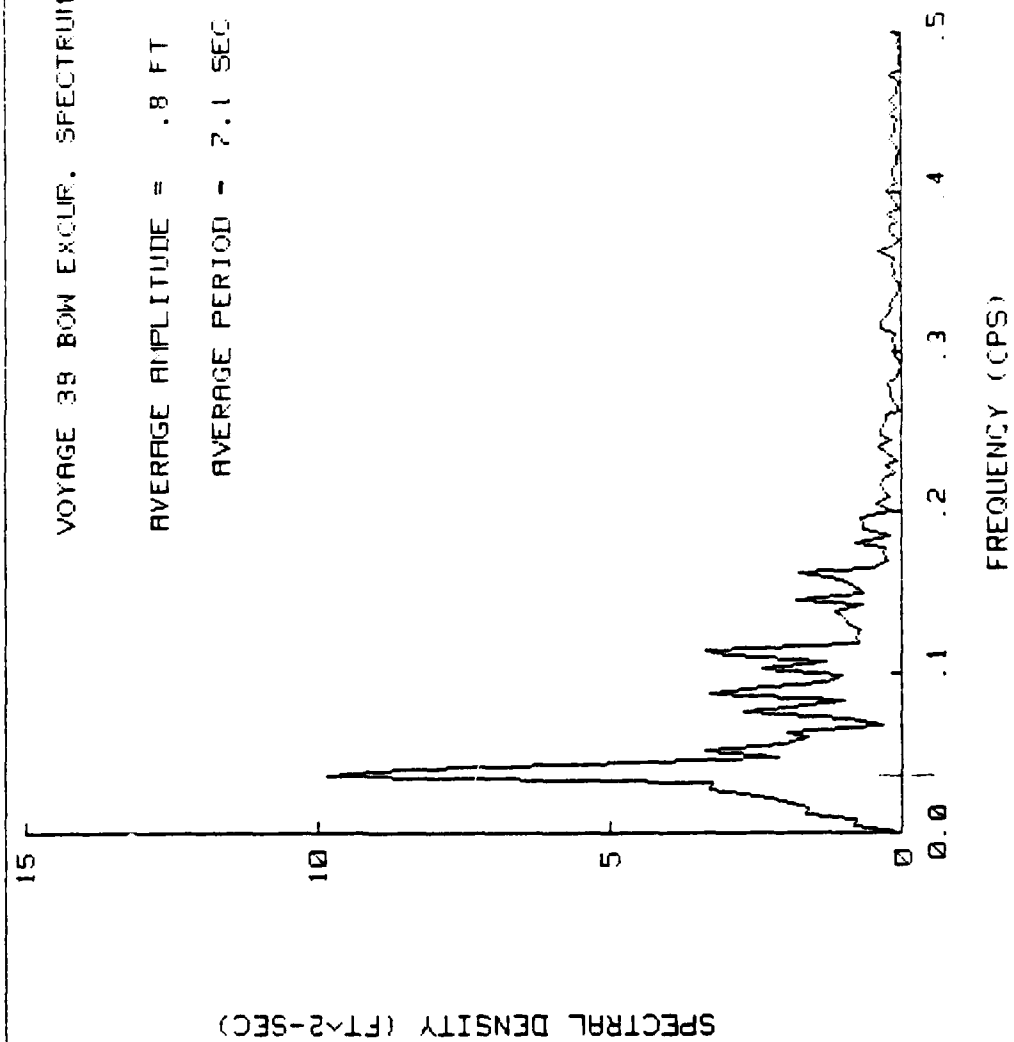




VOYAGE 39 BOW EXCUR. SPECTRUM BUDY 2-B

AVERAGE AMPLITUDE = .8 FT

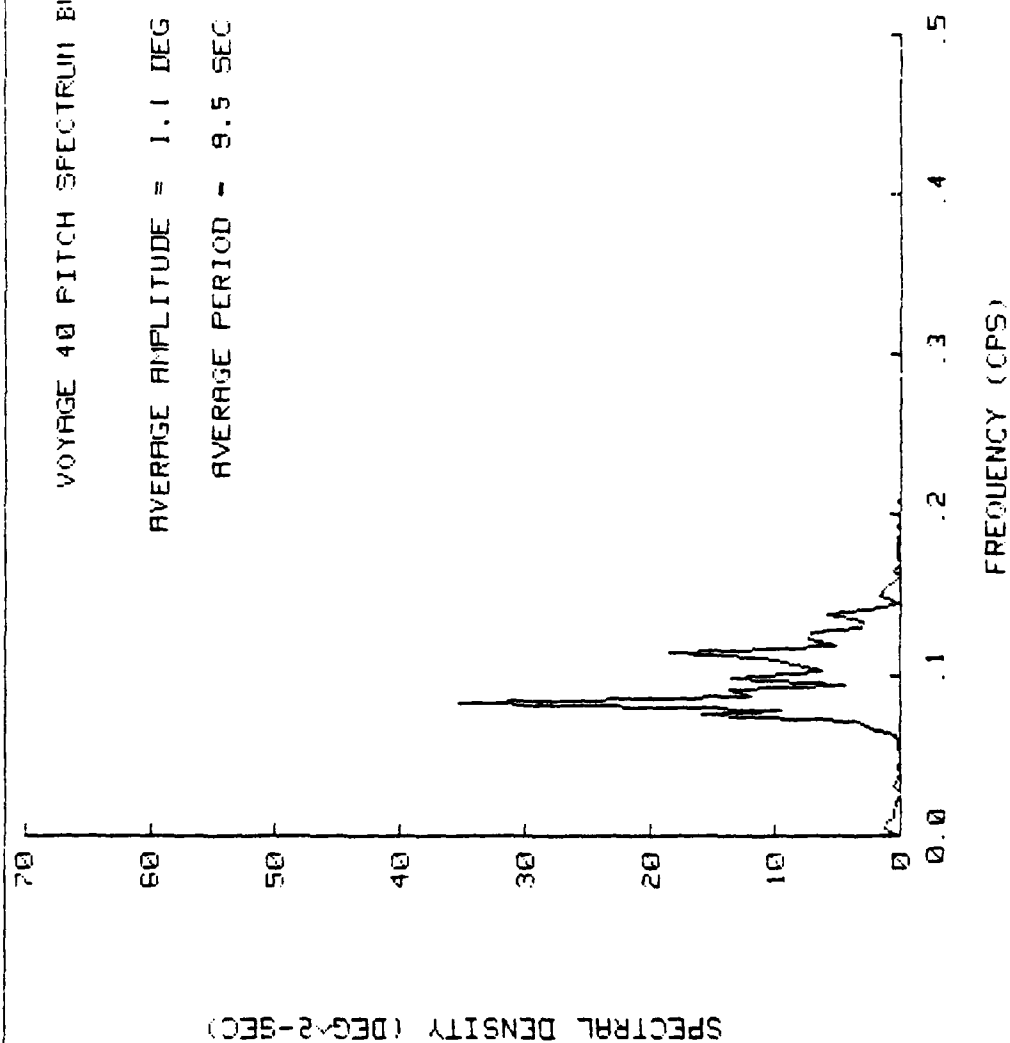
AVERAGE PERIOD = 7.1 SEC



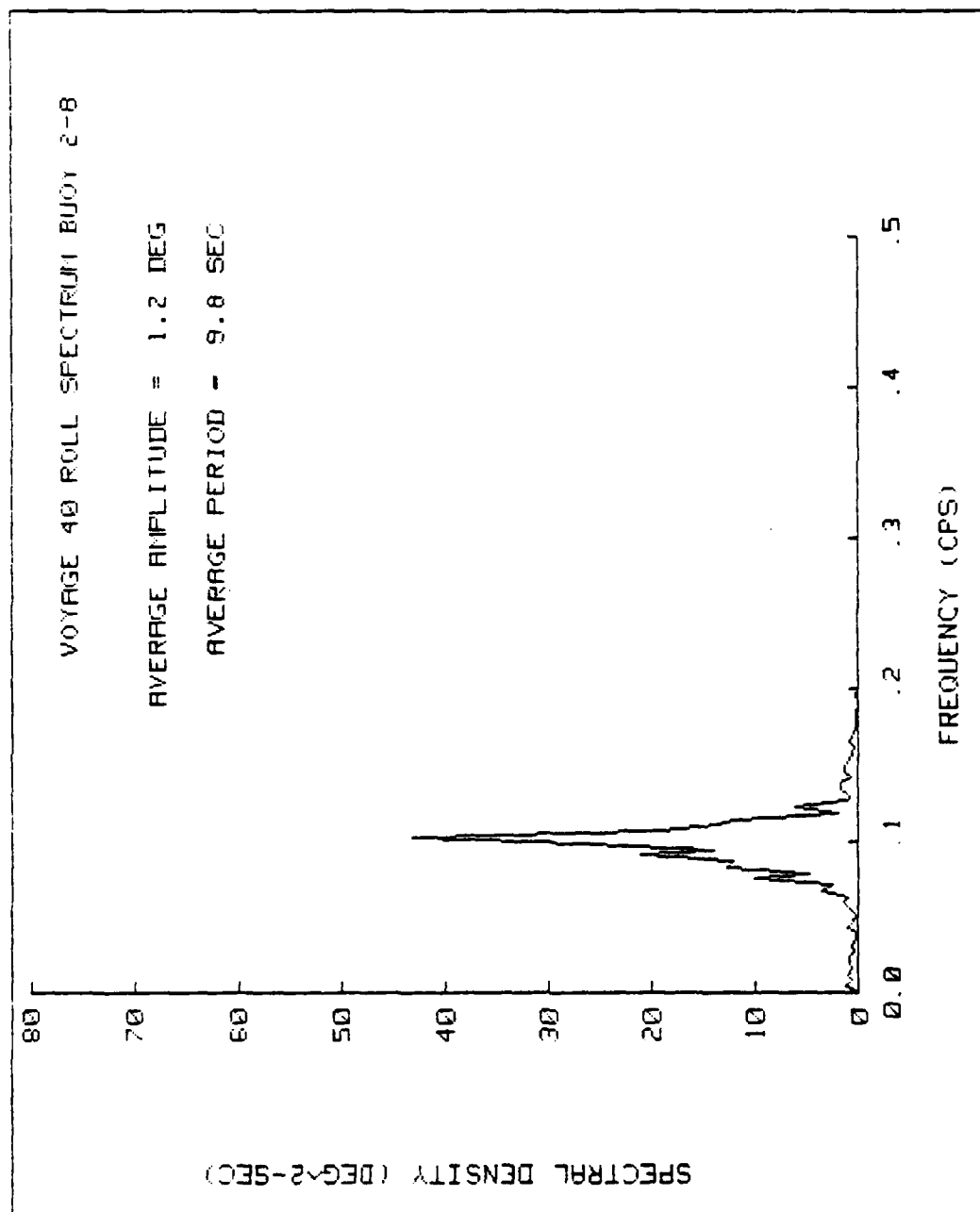
VOYAGE 40 PITCH SPECTRUM BUOY 2-8

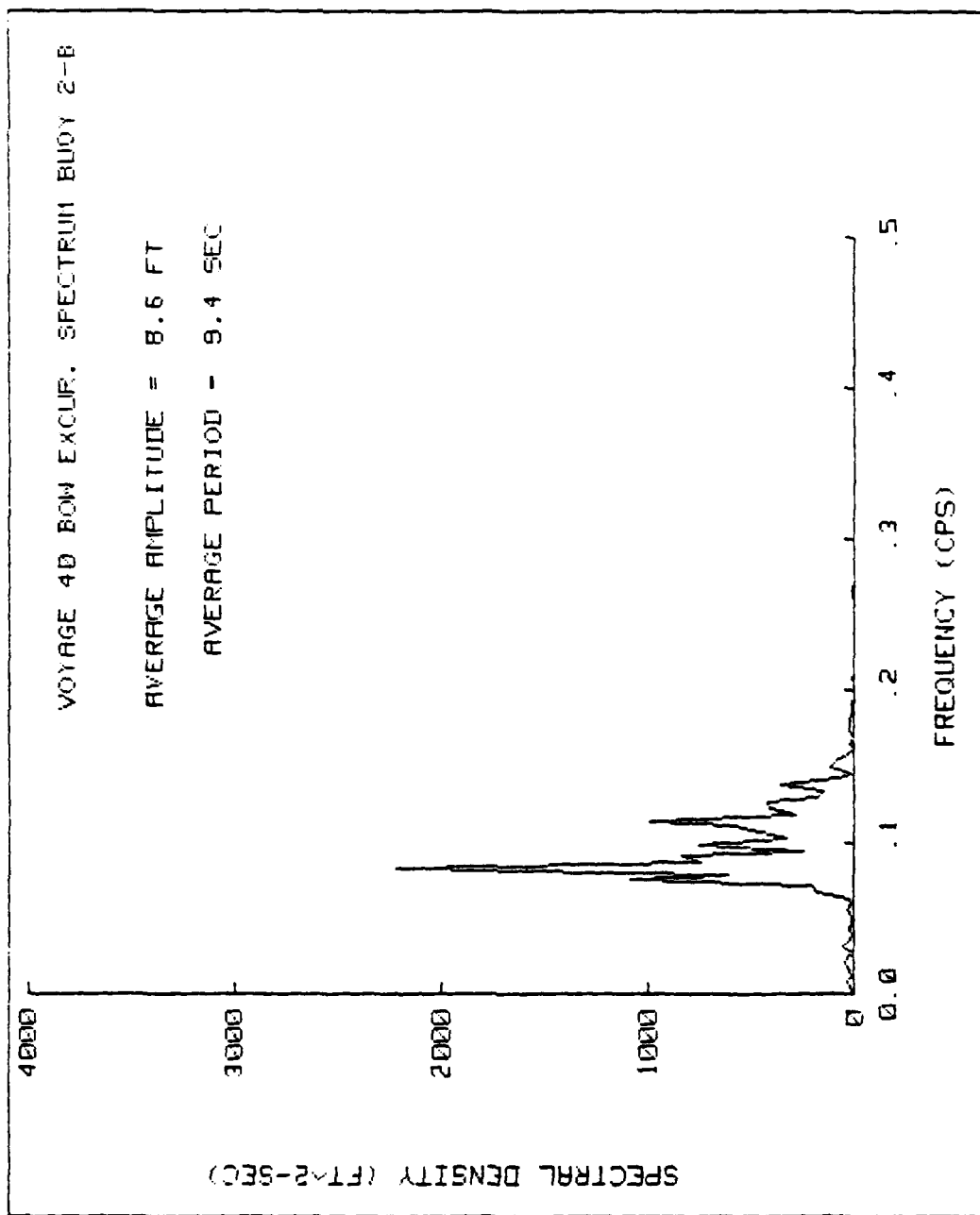
AVERAGE AMPLITUDE = 1.1 DEG

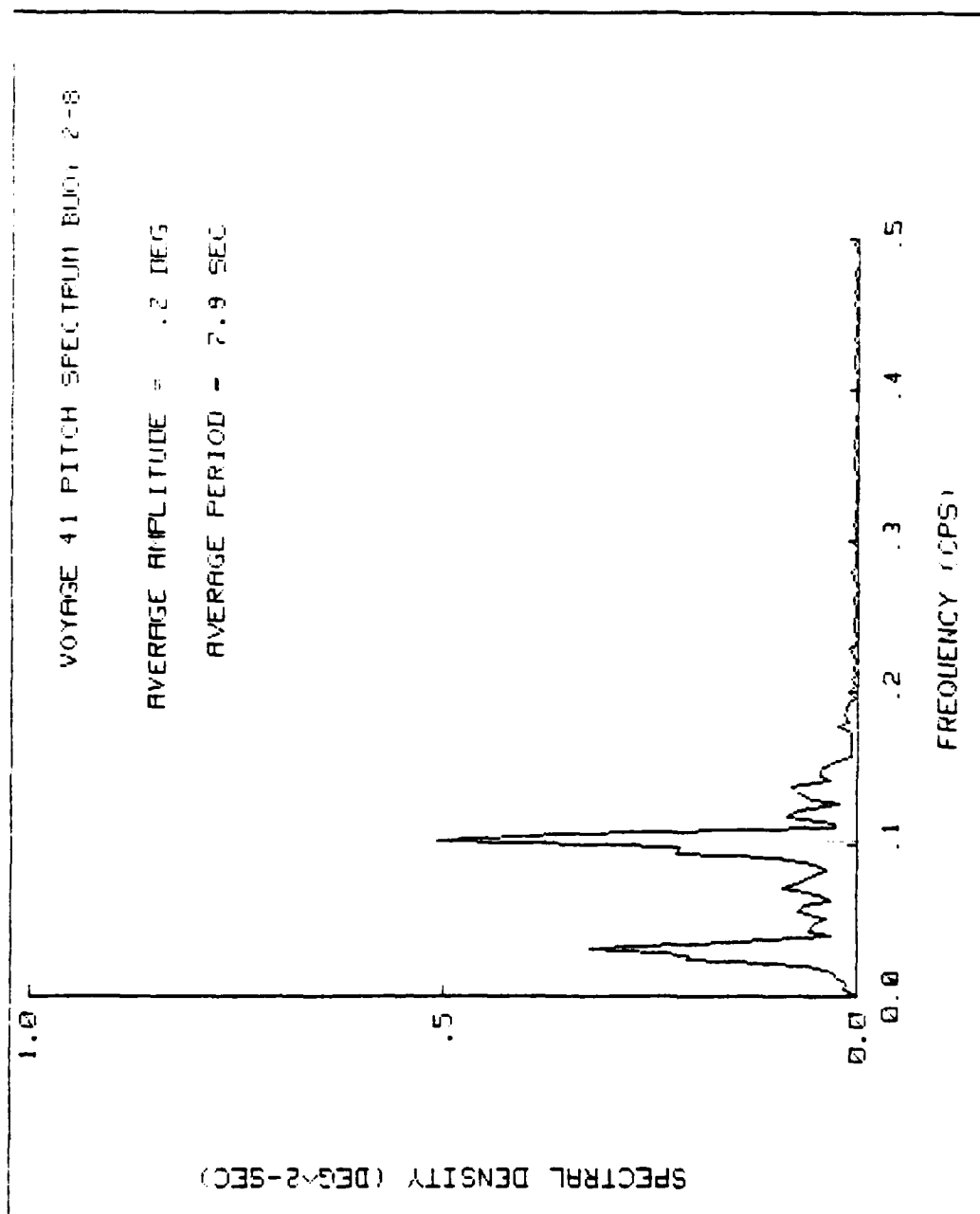
AVERAGE PERIOD = 9.5 SEC

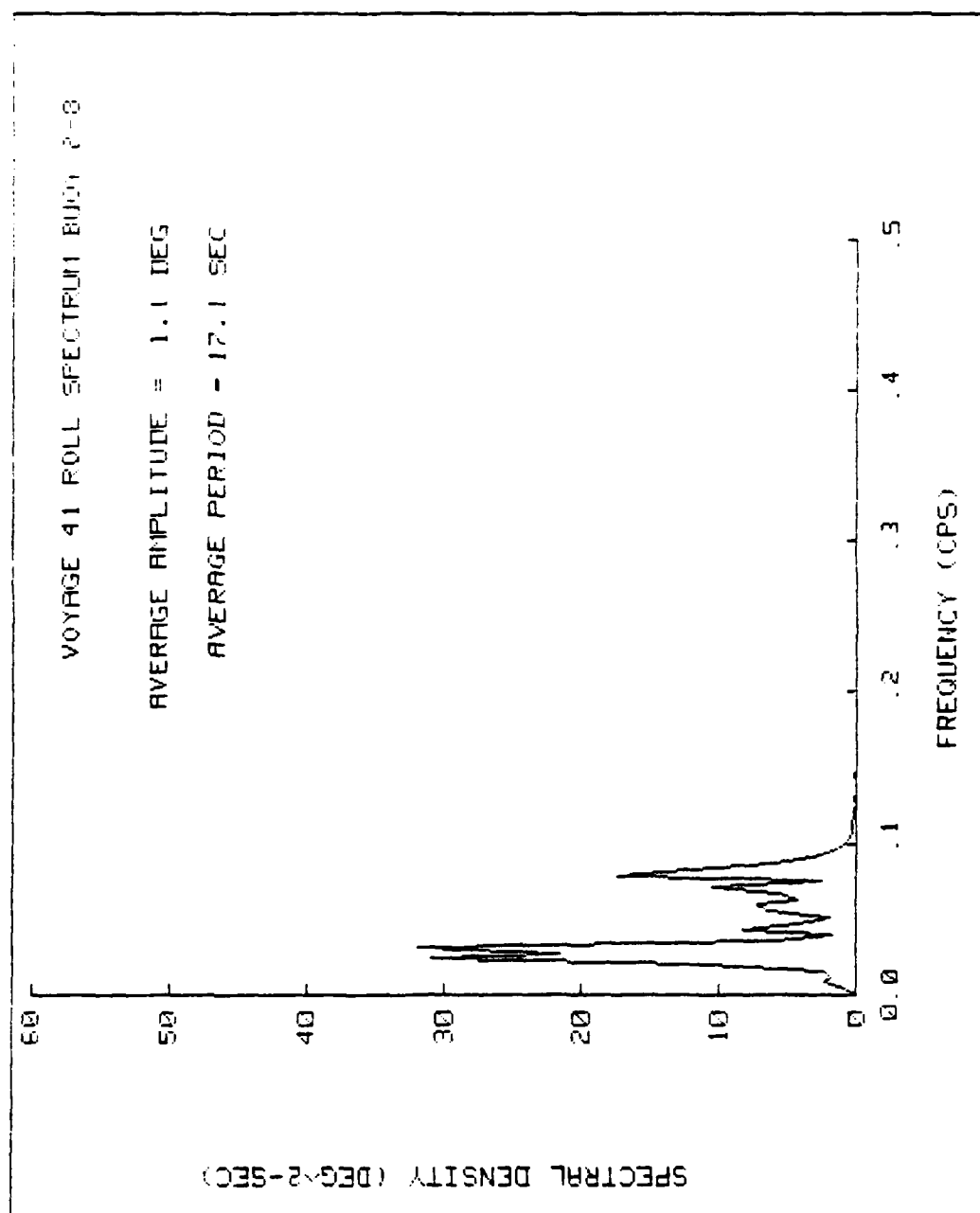


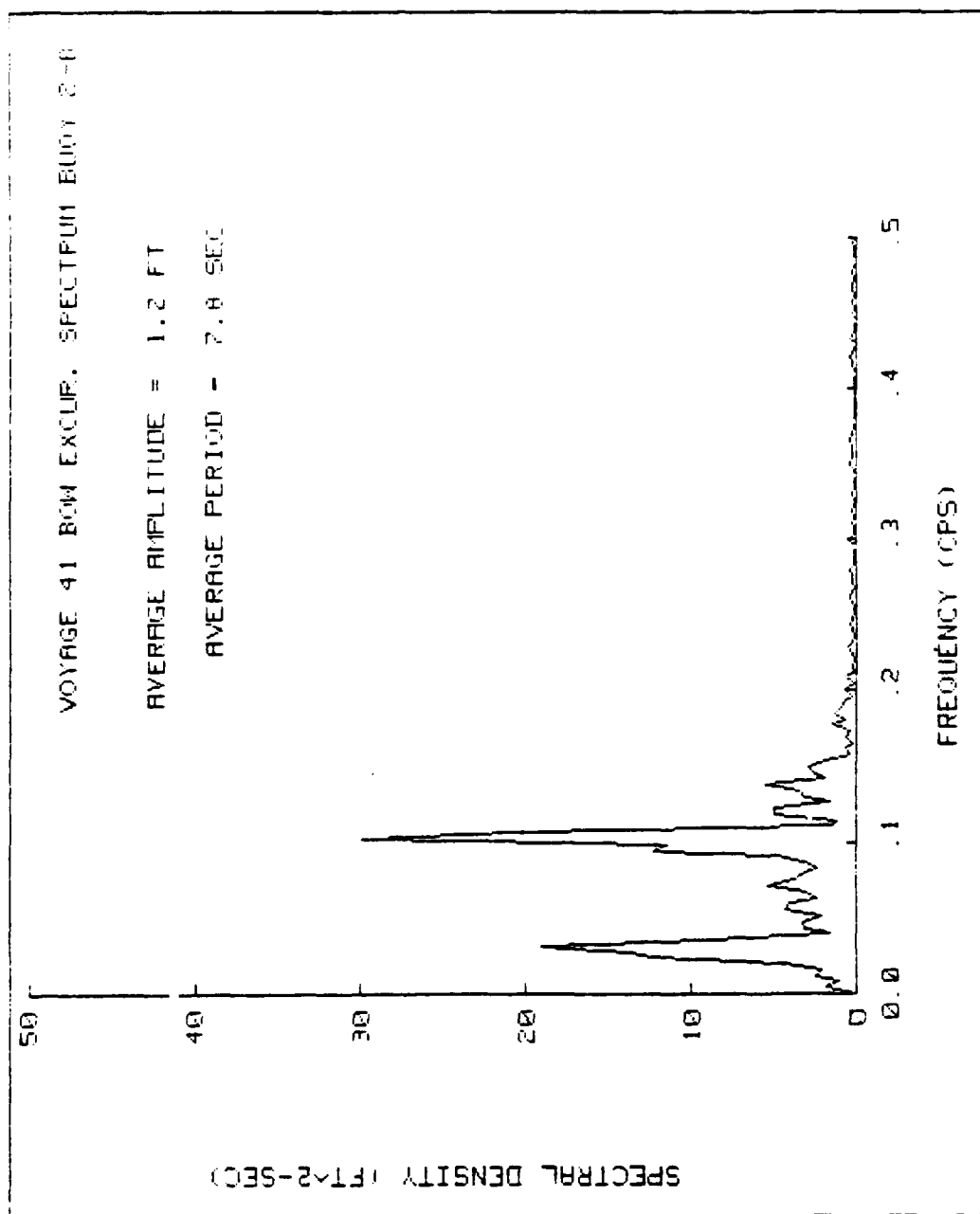


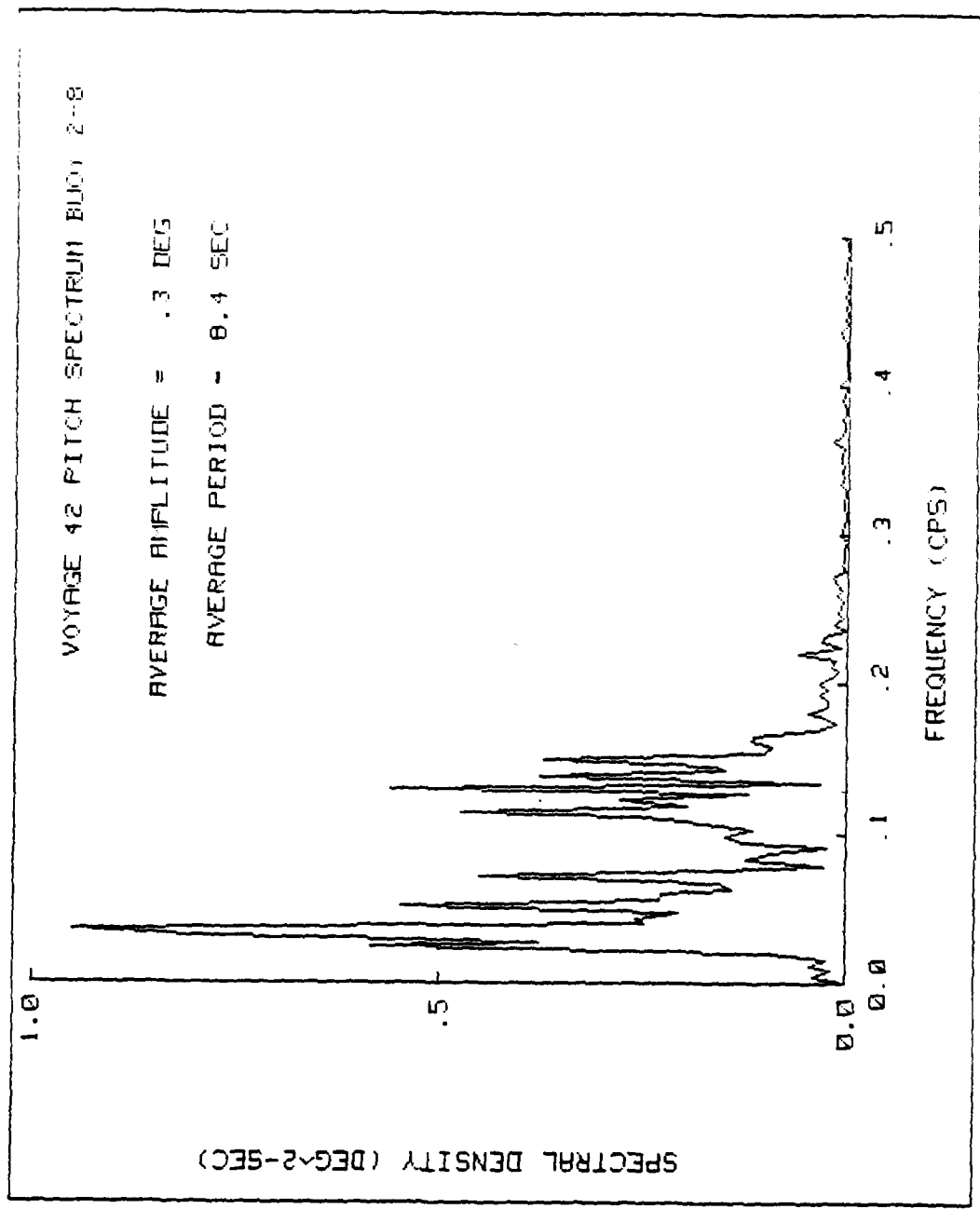


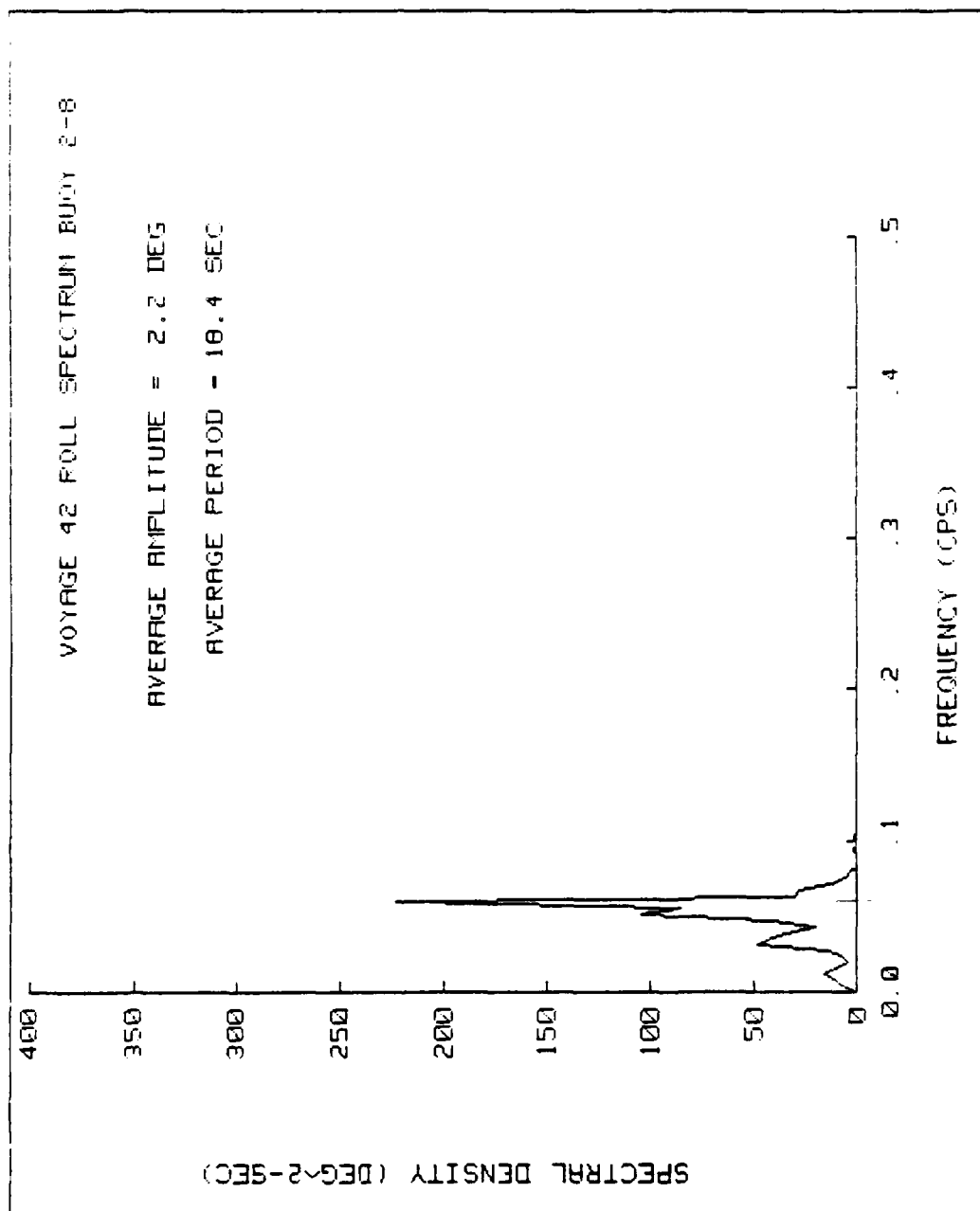


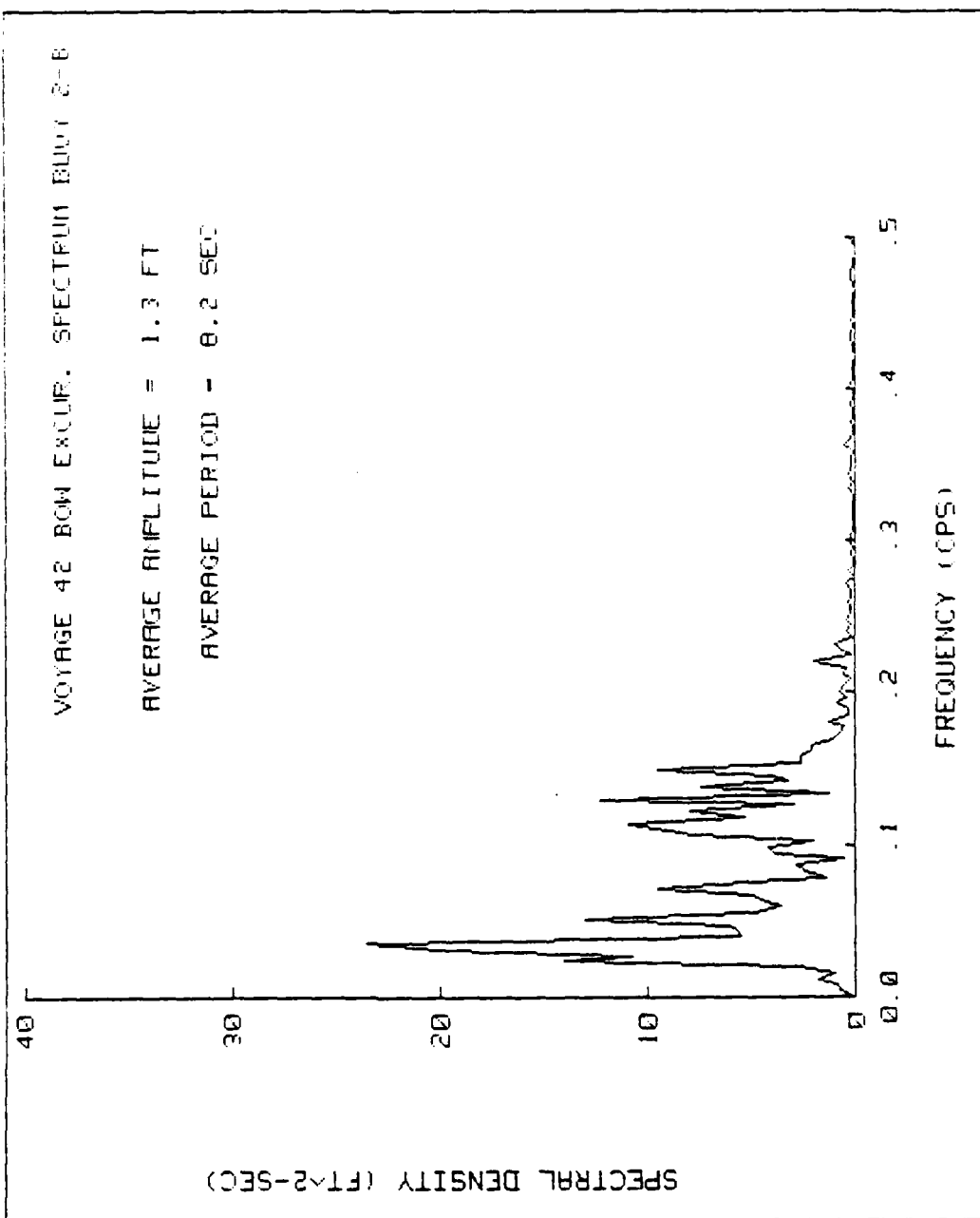










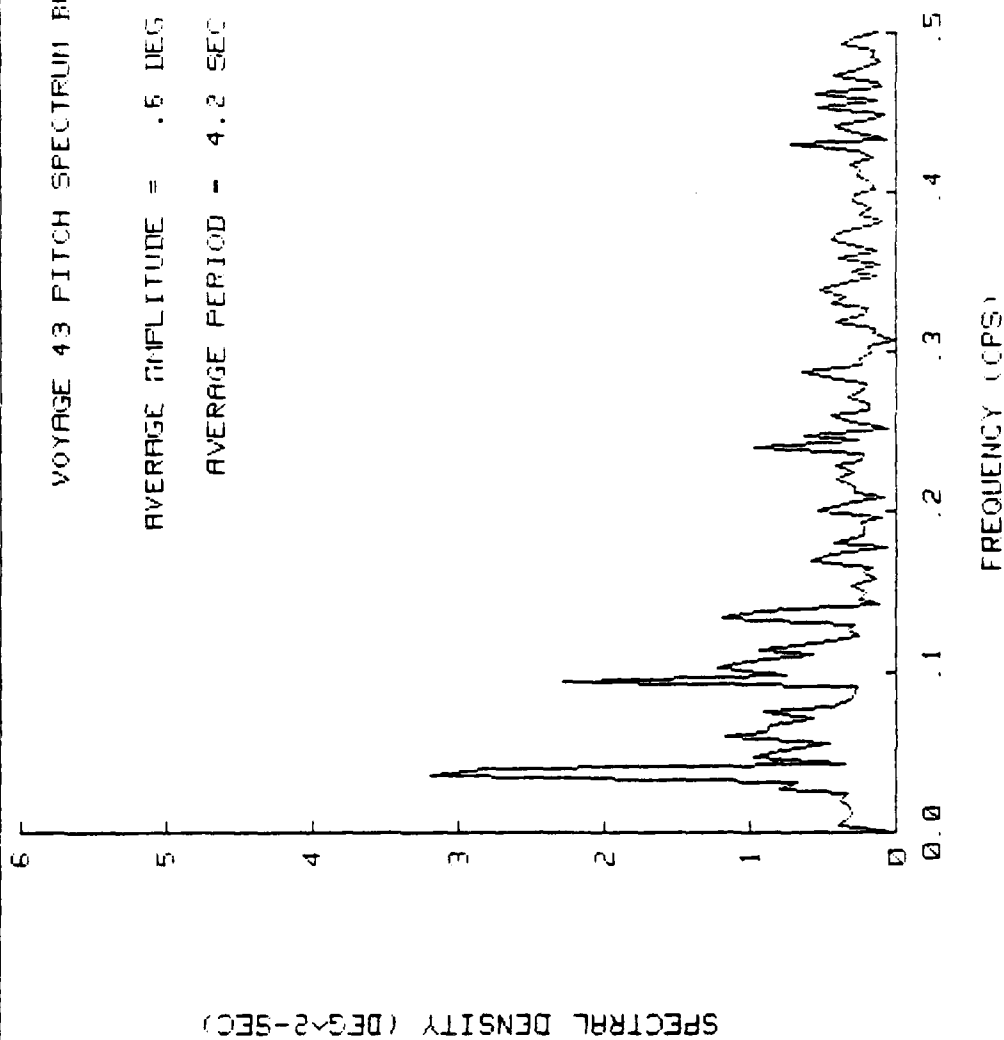


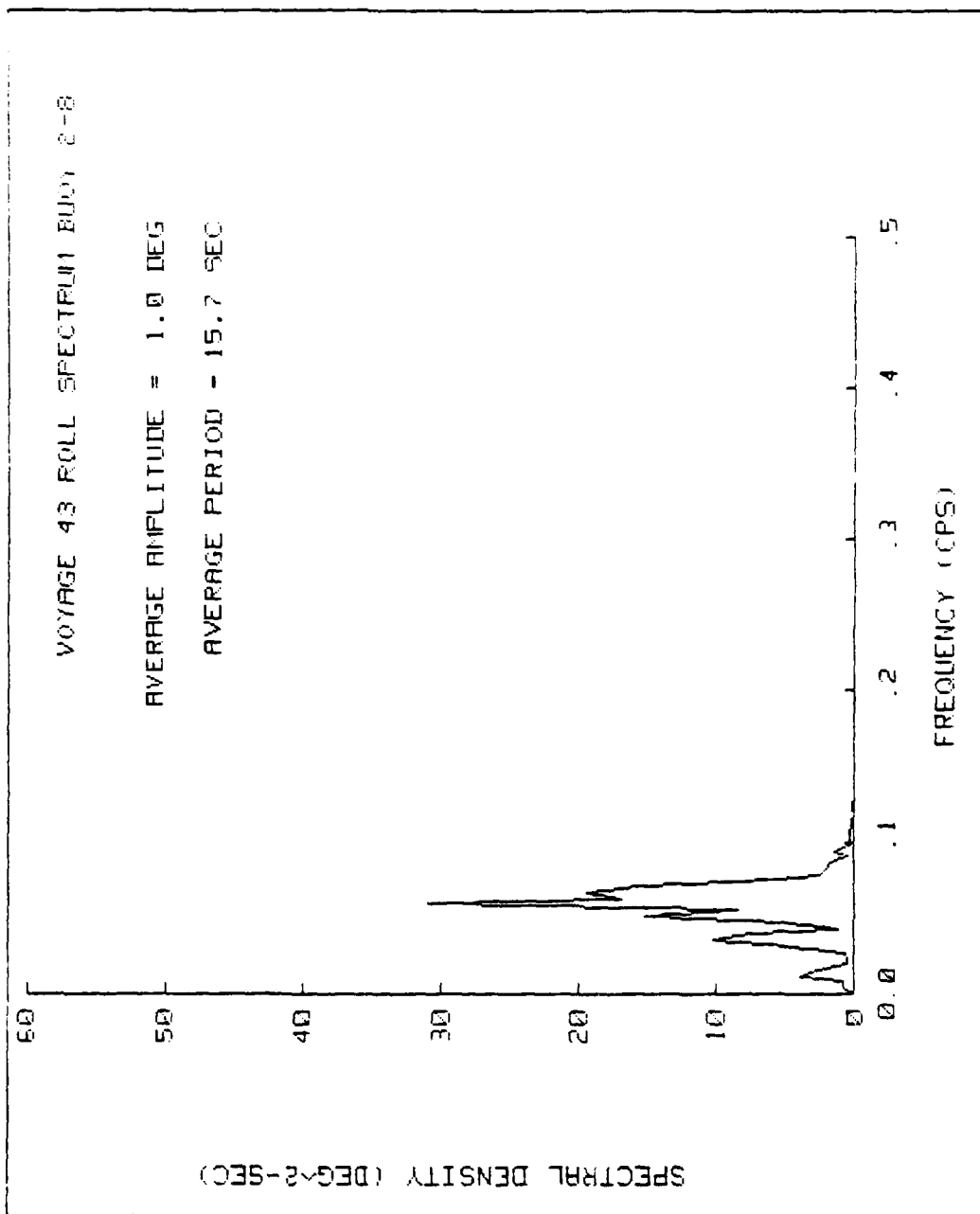


VOYAGE 43 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .6 DEG

AVERAGE PERIOD = 4.2 SEC





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COLUMBIA RIVER ENTRANCE CHANNEL DEEP-DRAFT VESSEL MOTION STUDY.--ETC(U)

SEP 80 S WANG, M KIMBLE, C BUTCHER, G D COX

DACW57-78-C-0028

UNCLASSIFIED

TETRAT-TC-3925-APP-B-K

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3 of 3

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1989-6

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DATE

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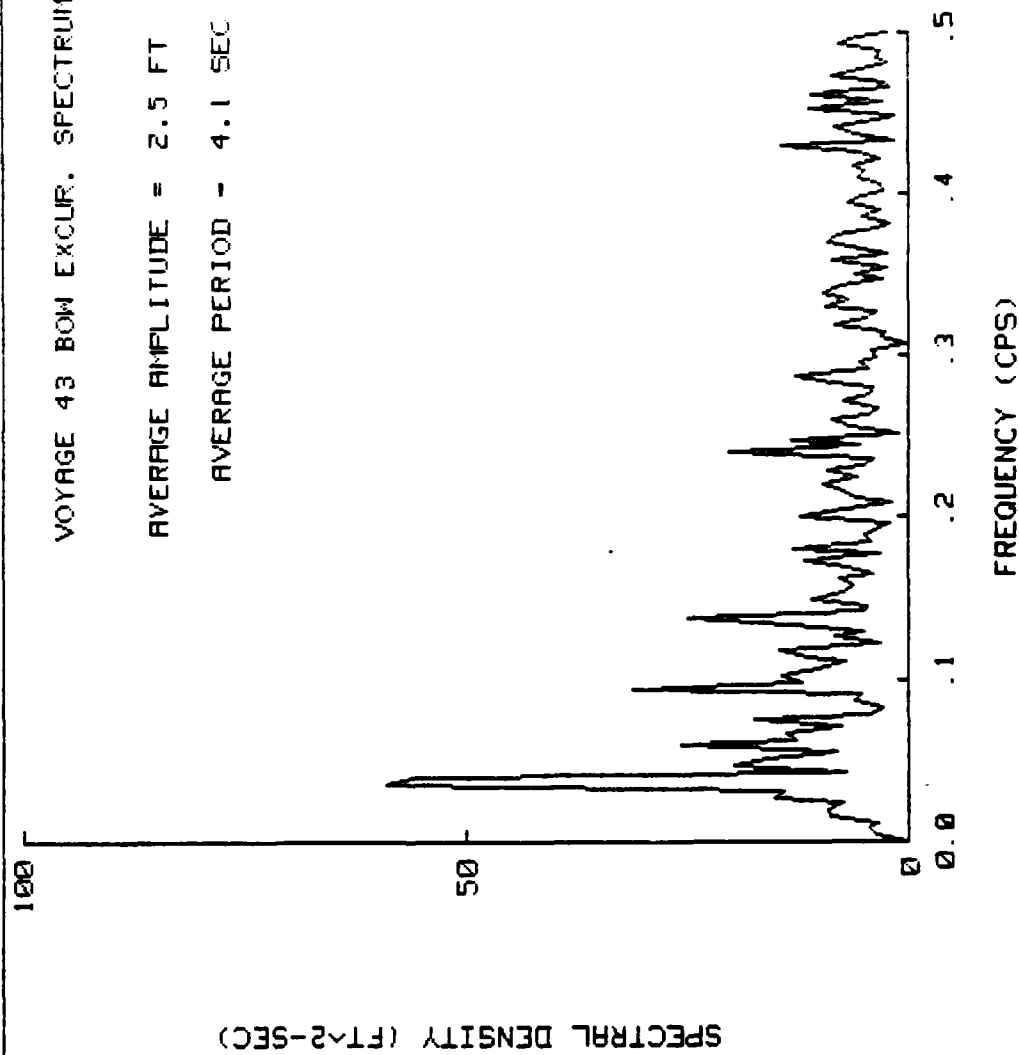
6-81

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VOYAGE 43 BOW EXCUR. SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 2.5 FT

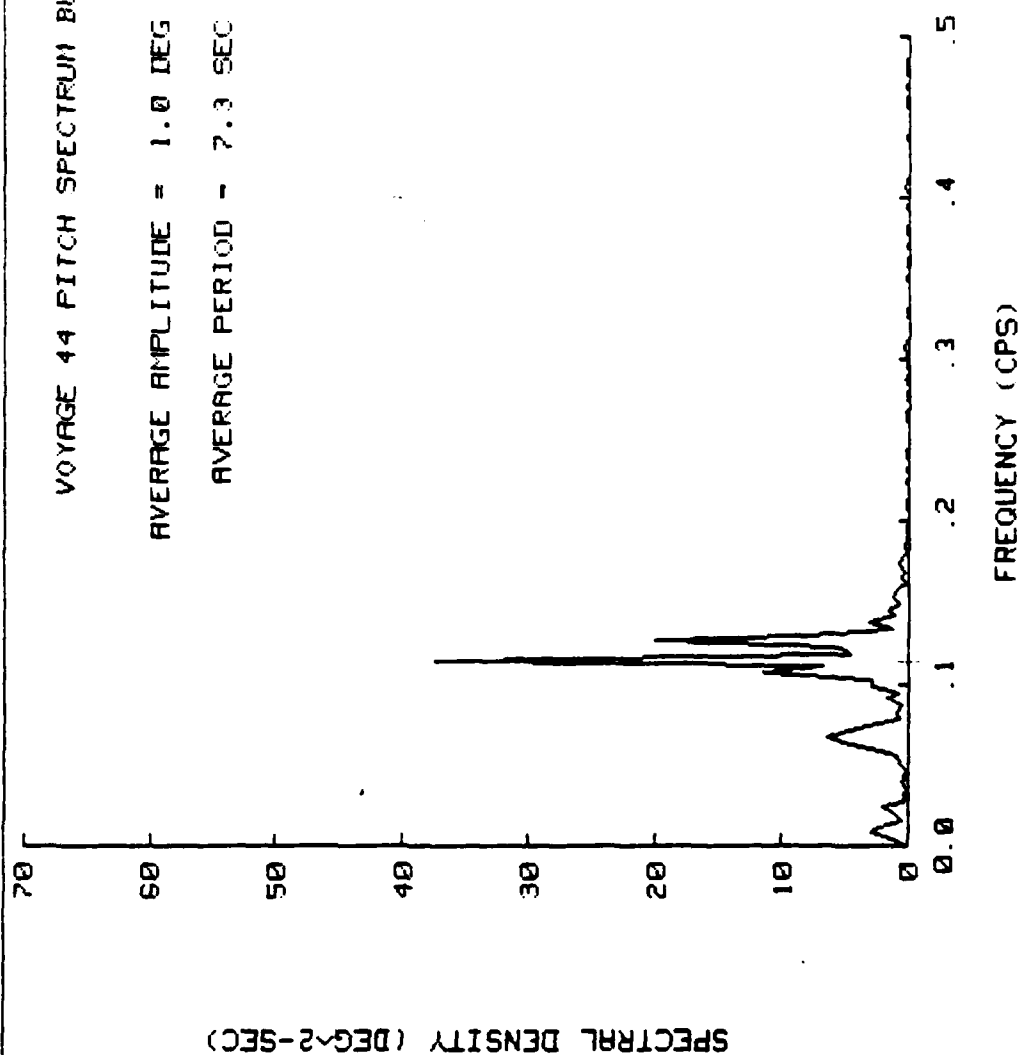
AVERAGE PERIOD = 4.1 SEC

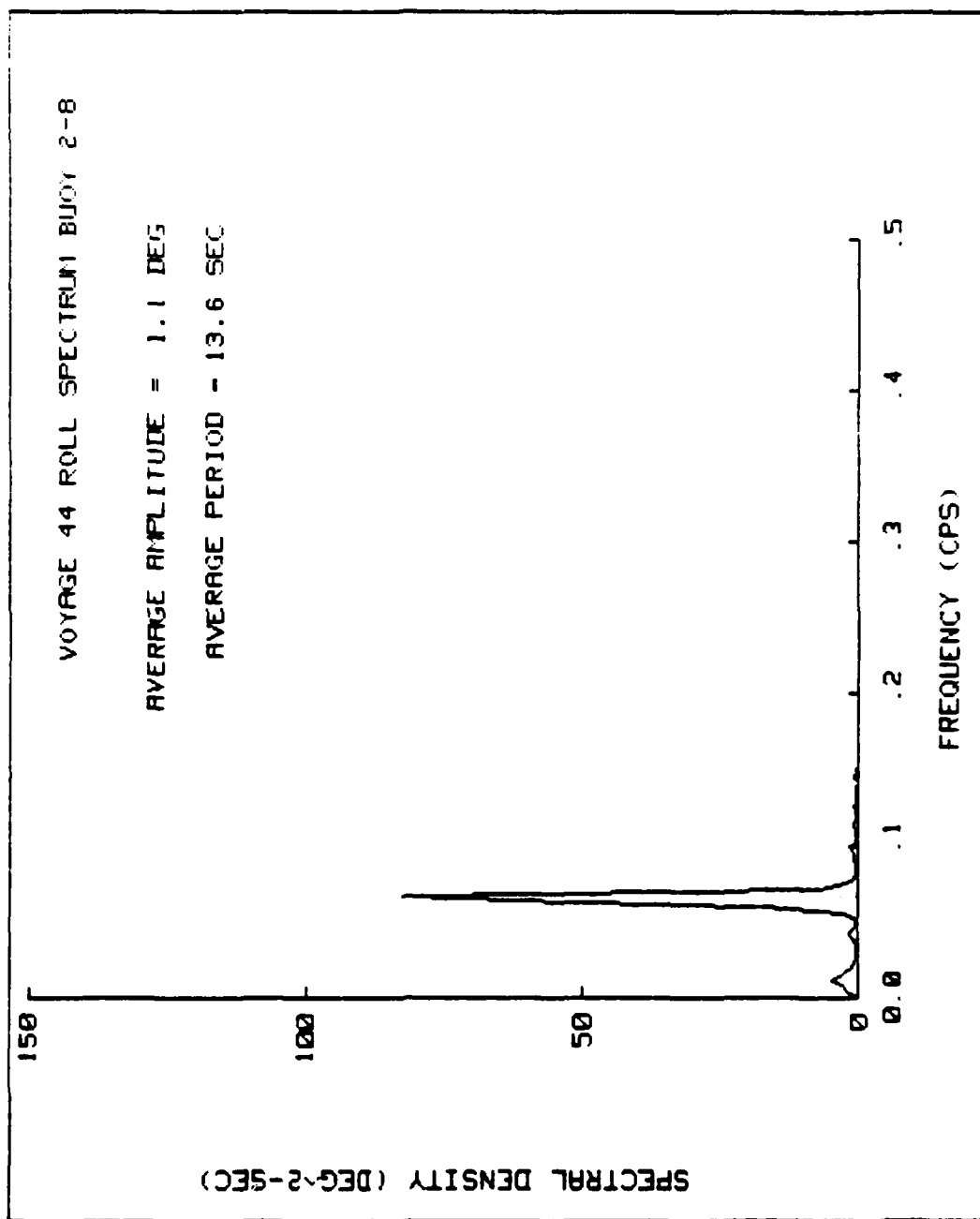


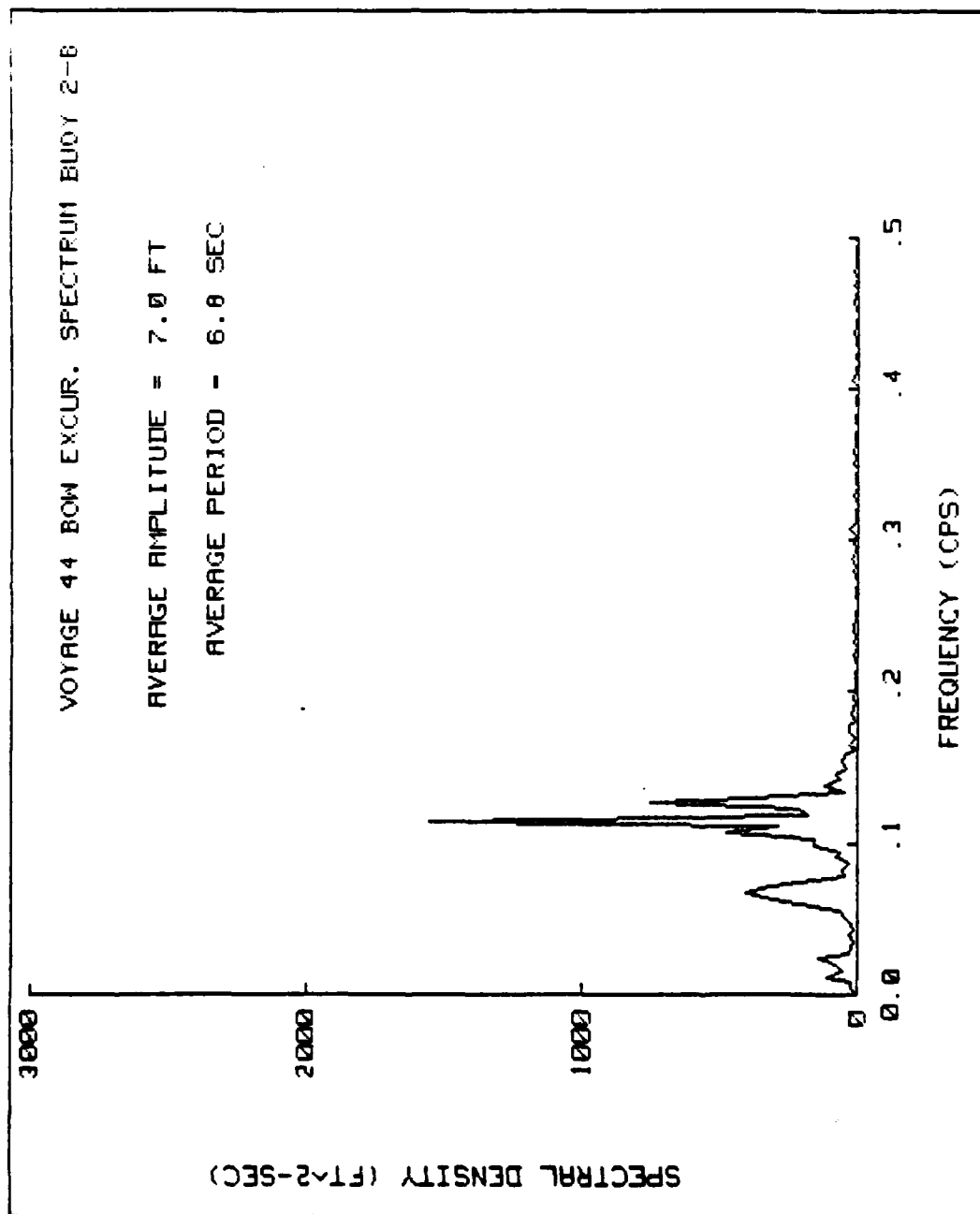
VOYAGE 44 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 1.0 DEG

AVERAGE PERIOD = 7.3 SEC



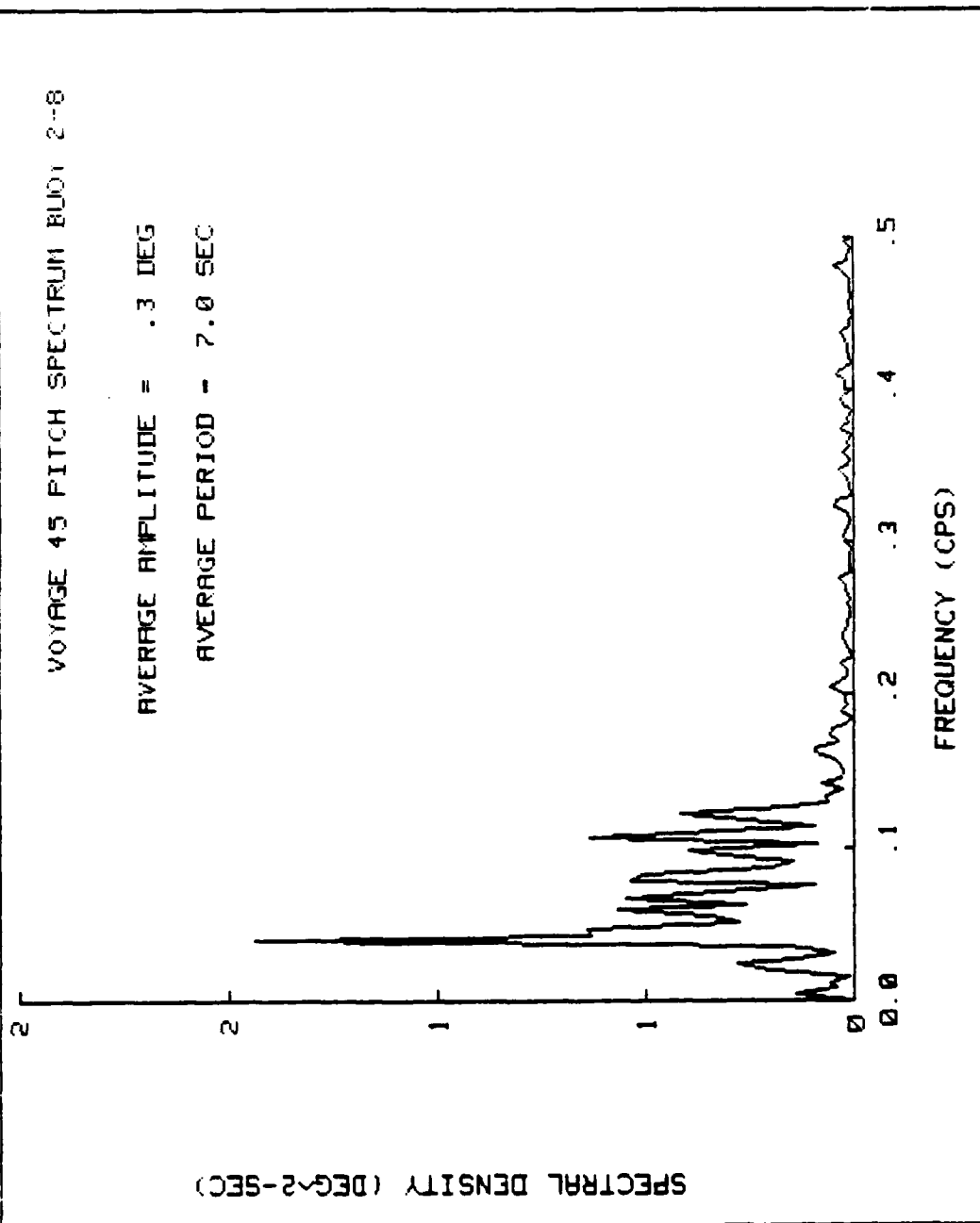




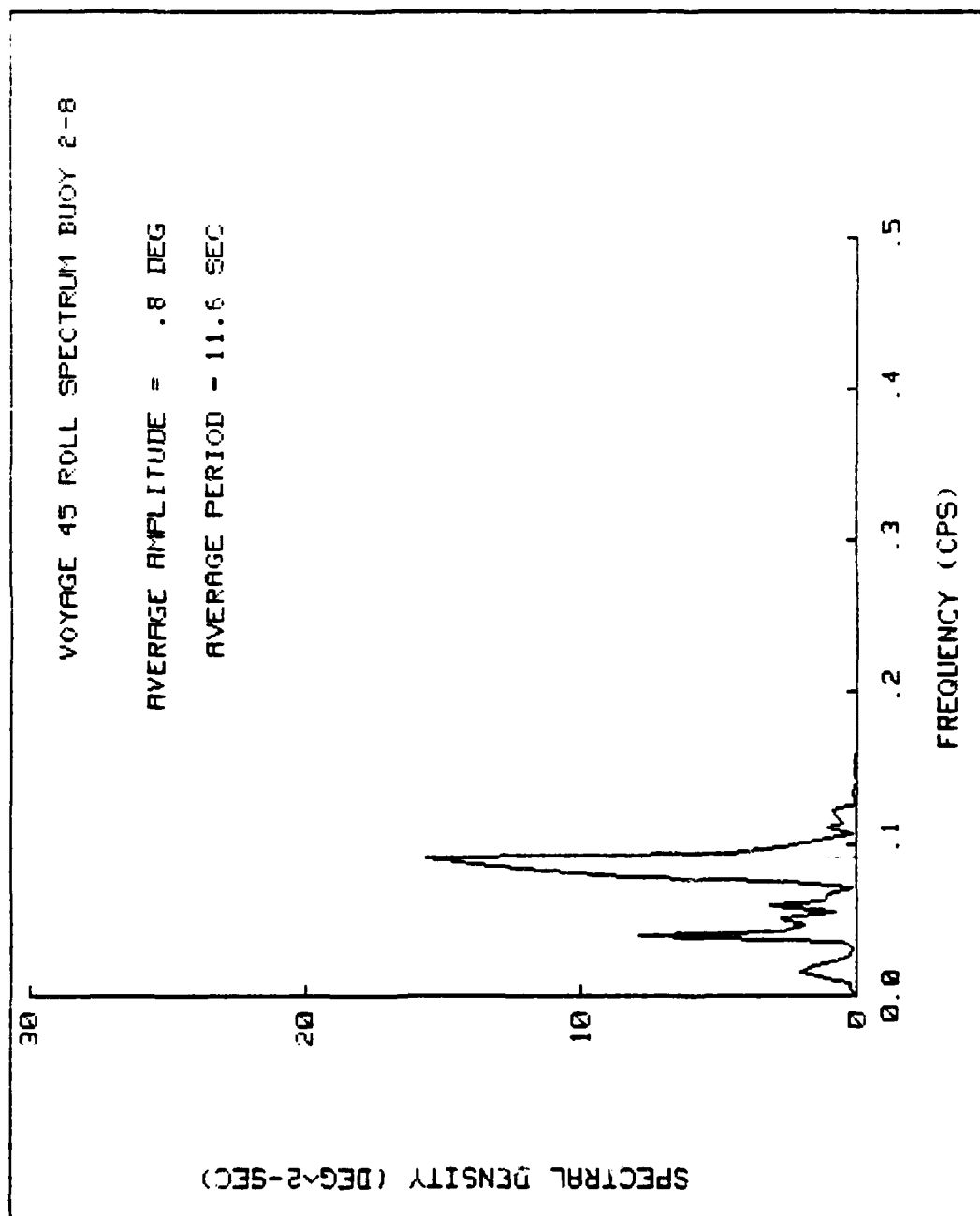
VOYAGE 45 PITCH SPECTRUM BUOY 2-8

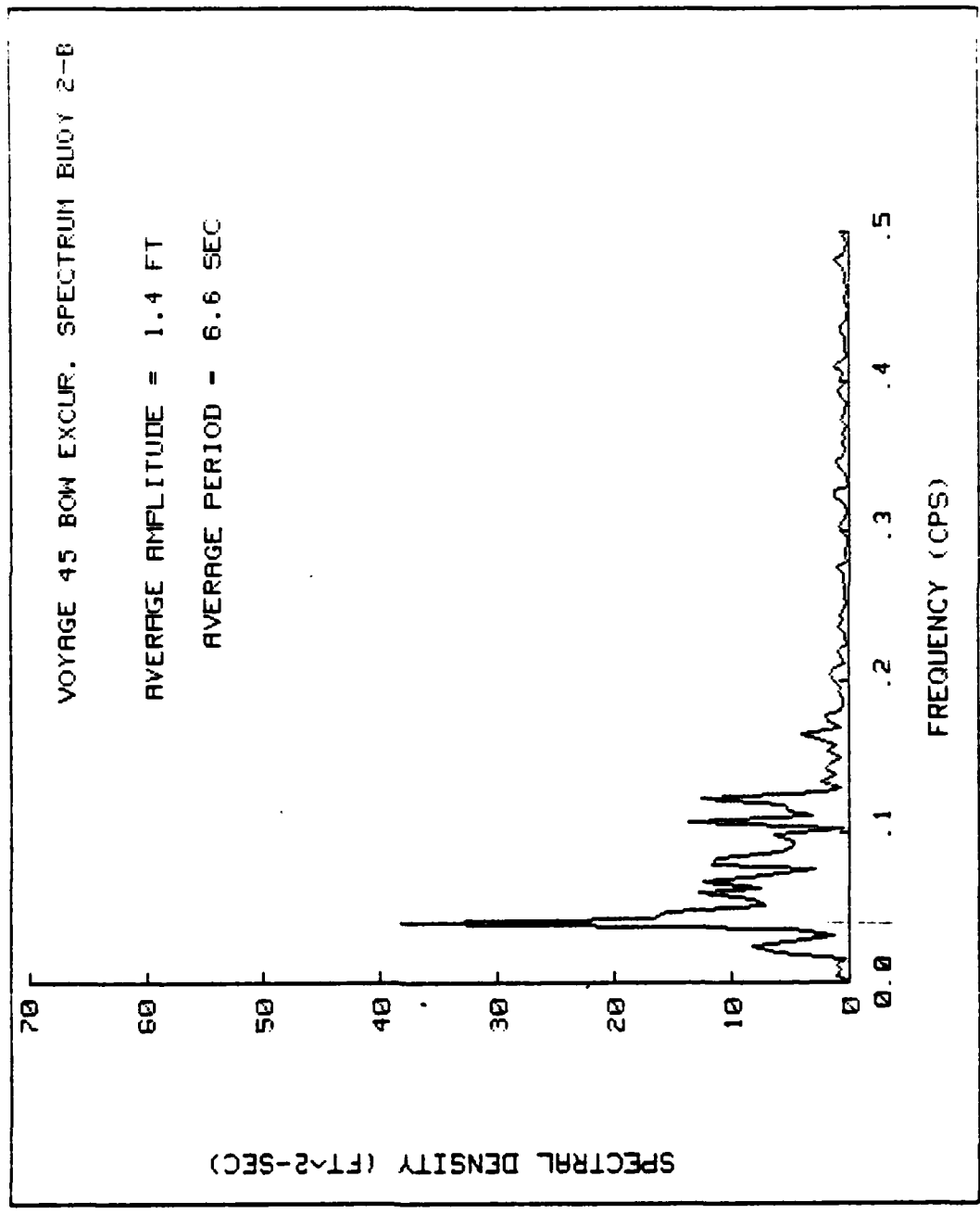
AVERAGE AMPLITUDE = .3 DEG

AVERAGE PERIOD - 7.0 SEC





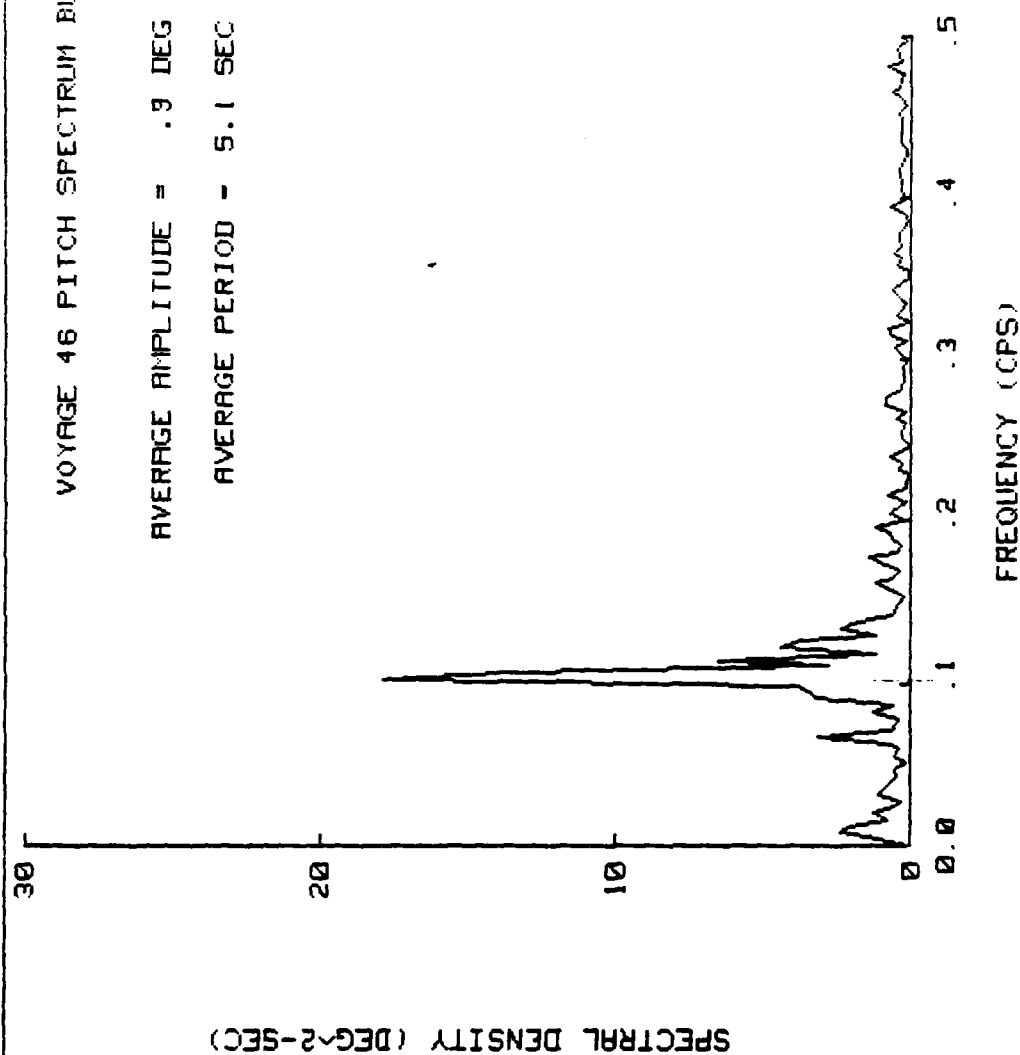




VOYAGE 46 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .9 DEG

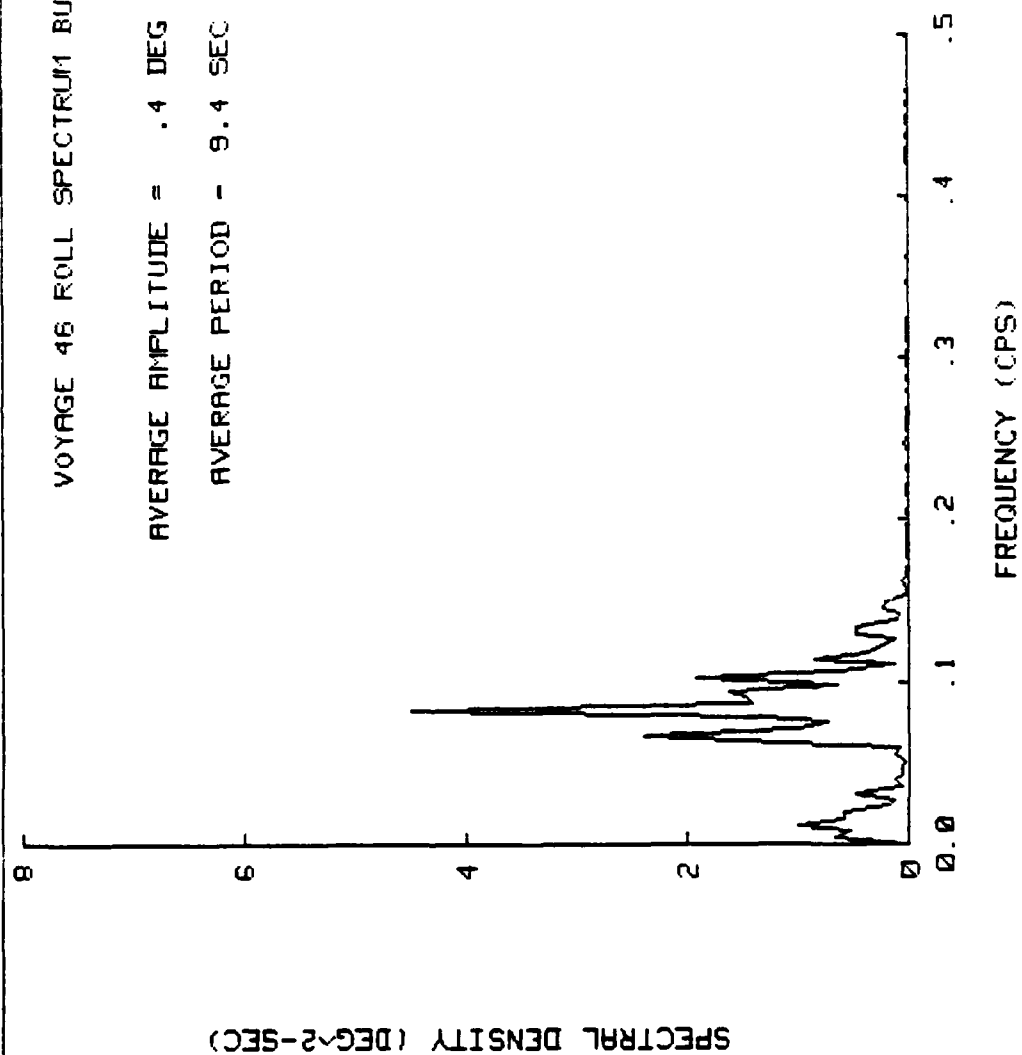
AVERAGE PERIOD = 5.1 SEC

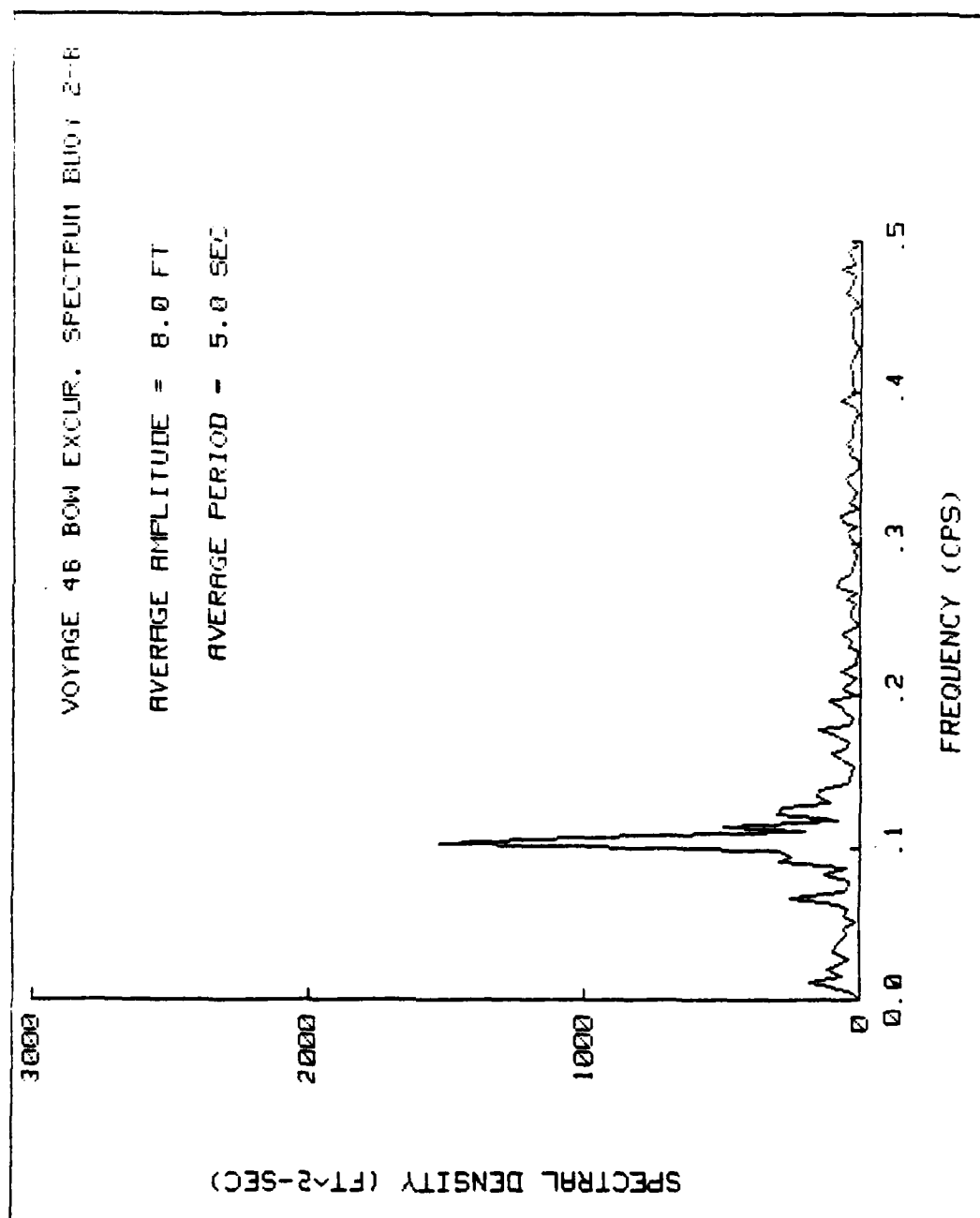


VOYAGE 46 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .4 DEG

AVERAGE PERIOD = 9.4 SEC

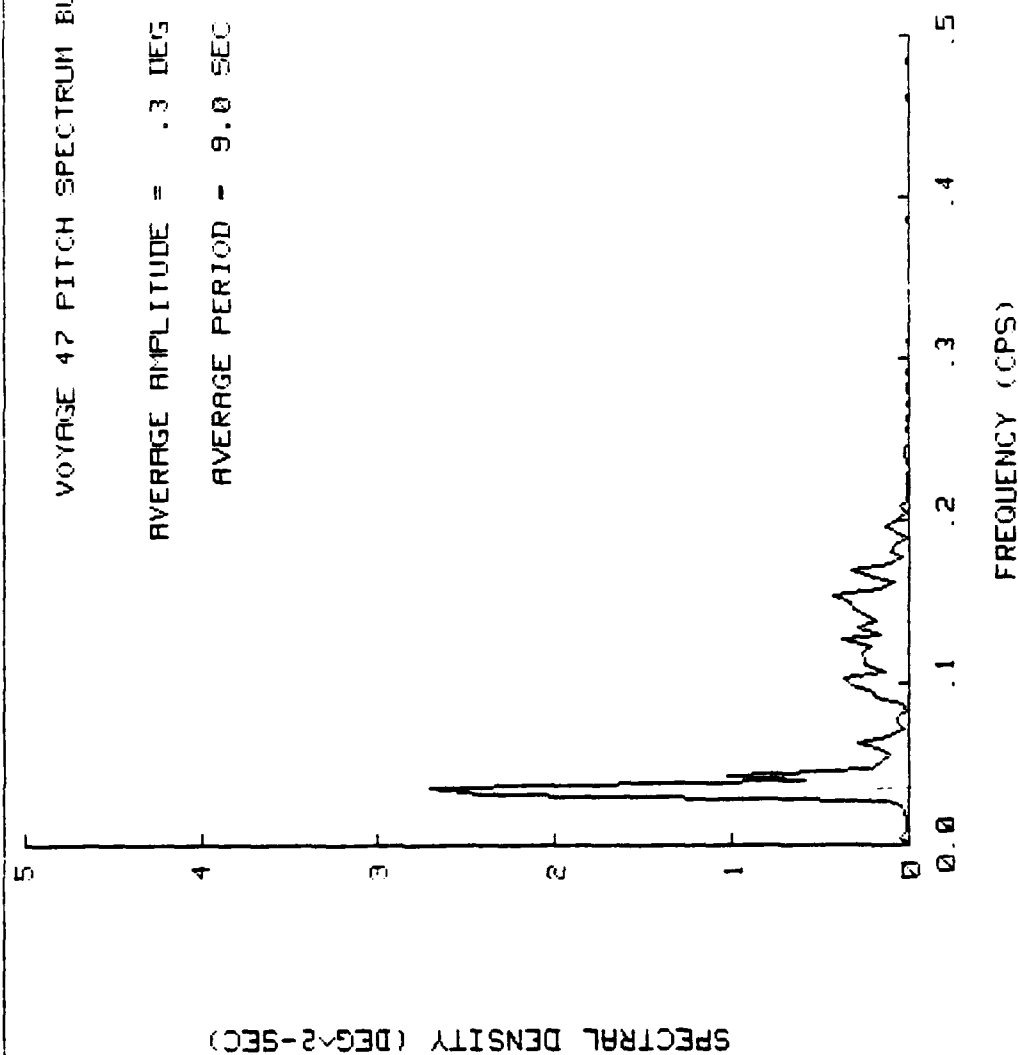


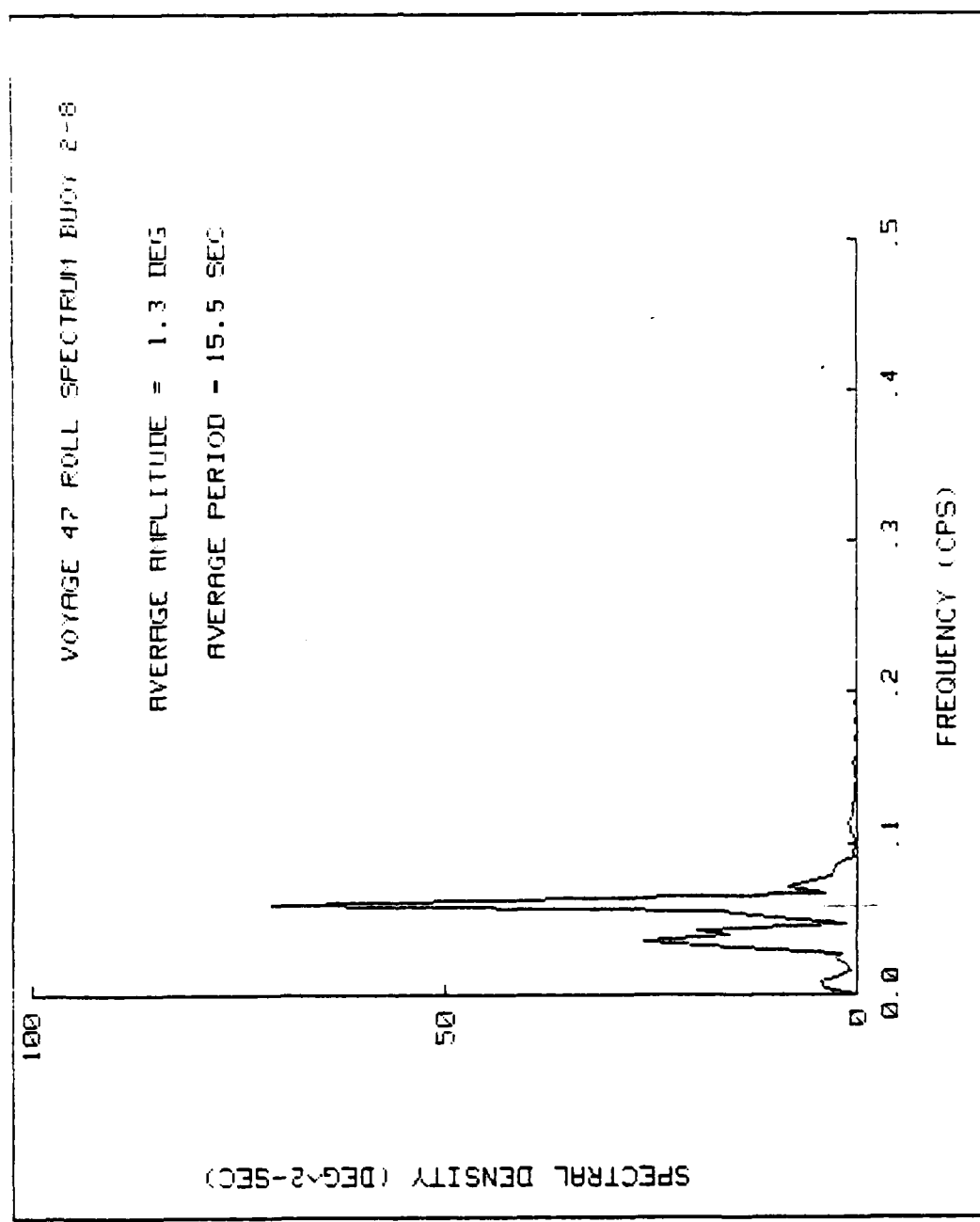


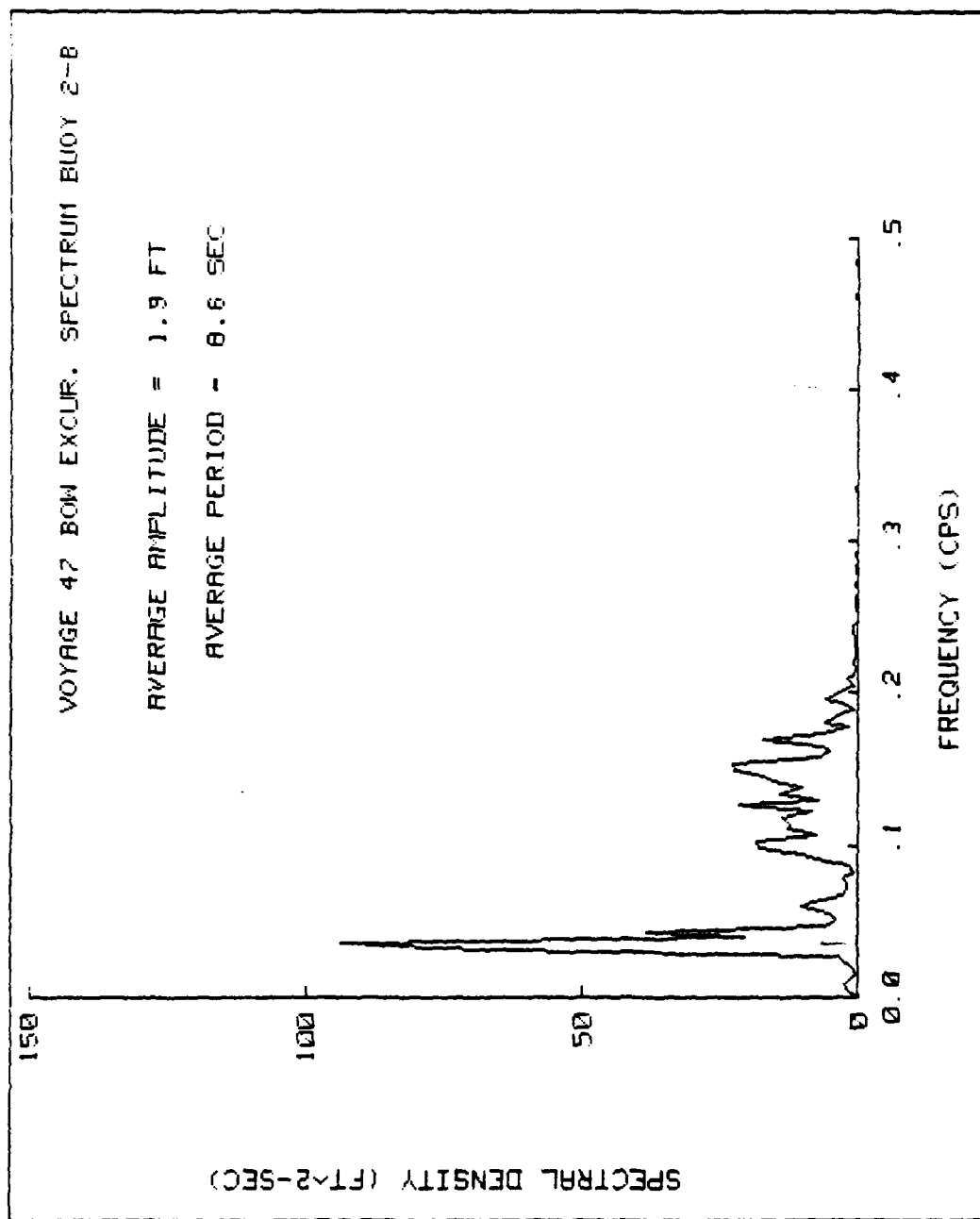
VOYAGE 47 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .3 DEG

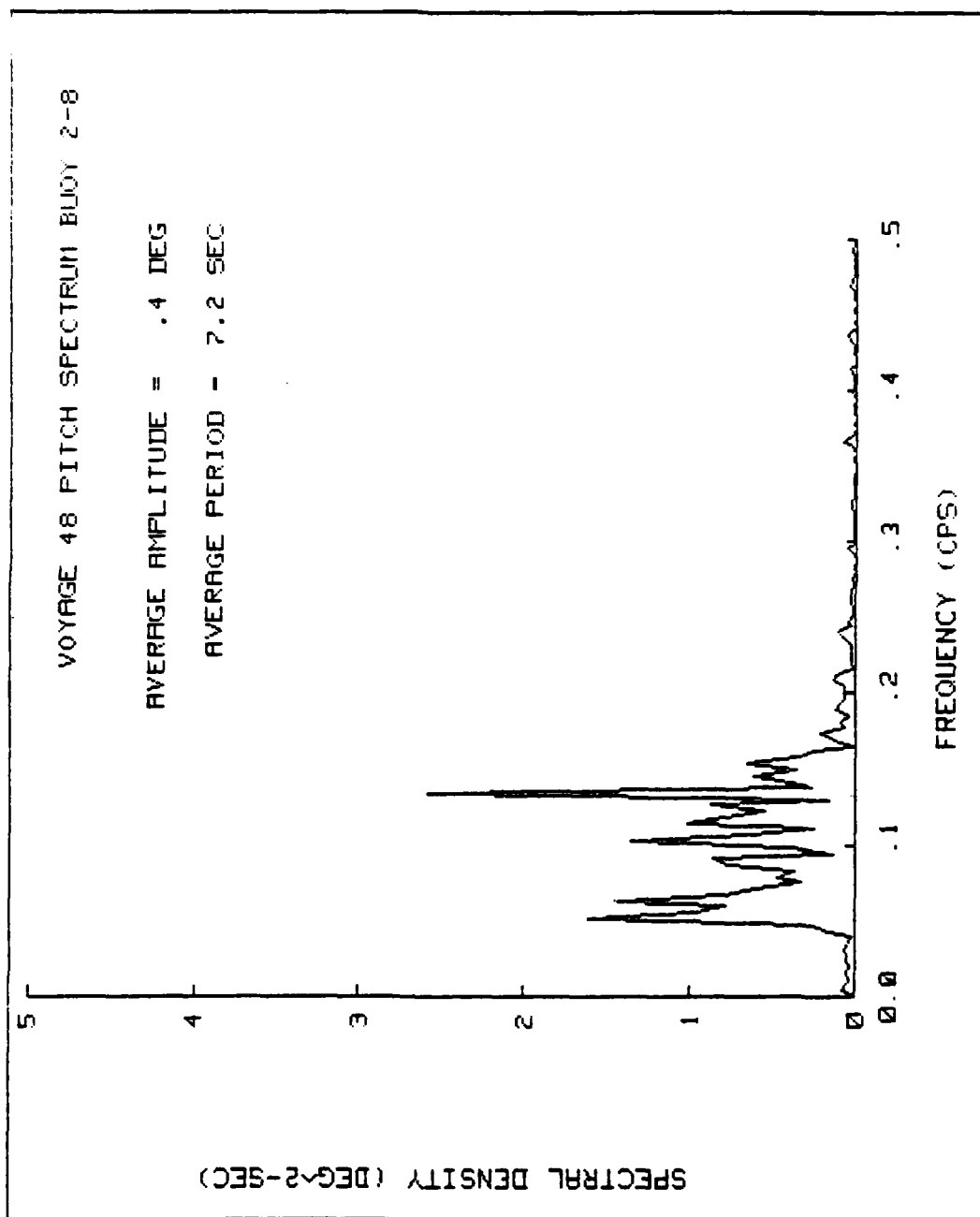
AVERAGE PERIOD = 9.0 SEC







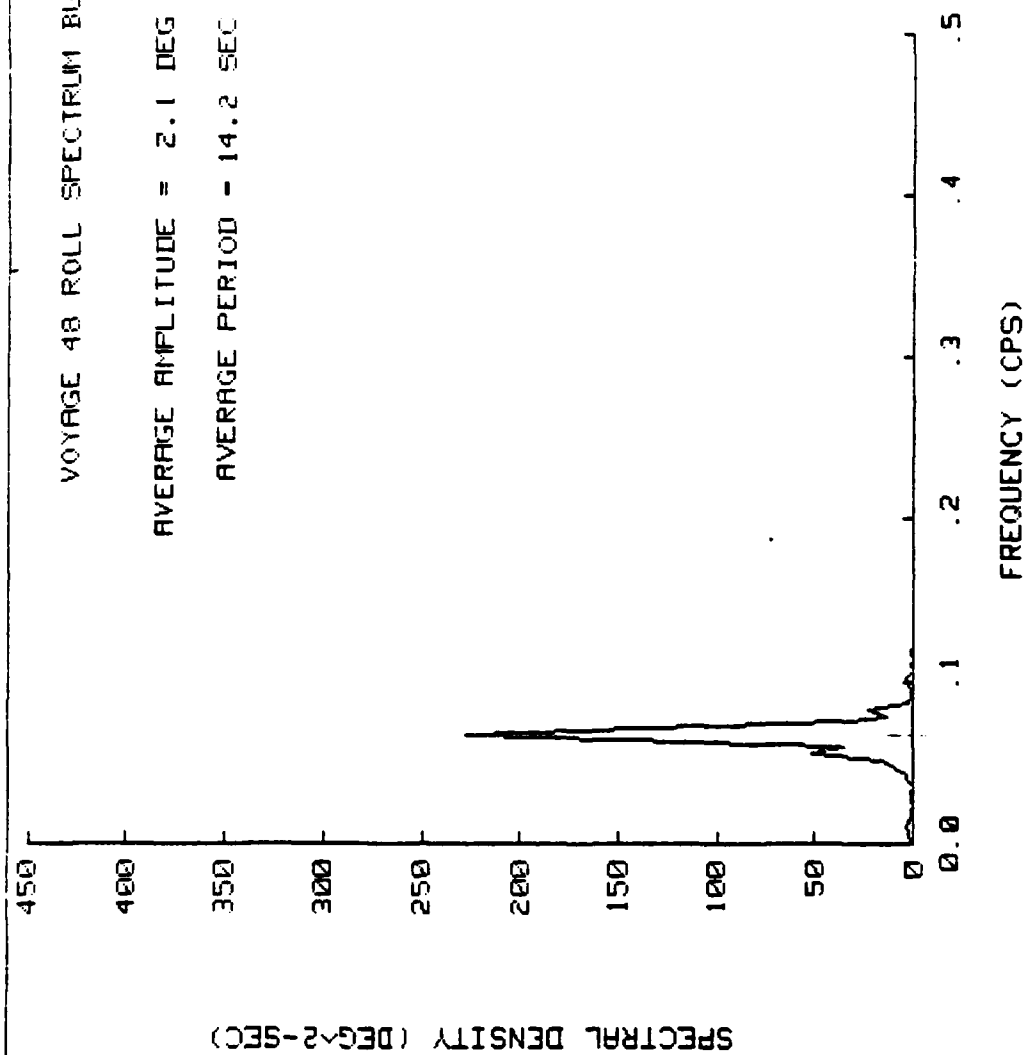


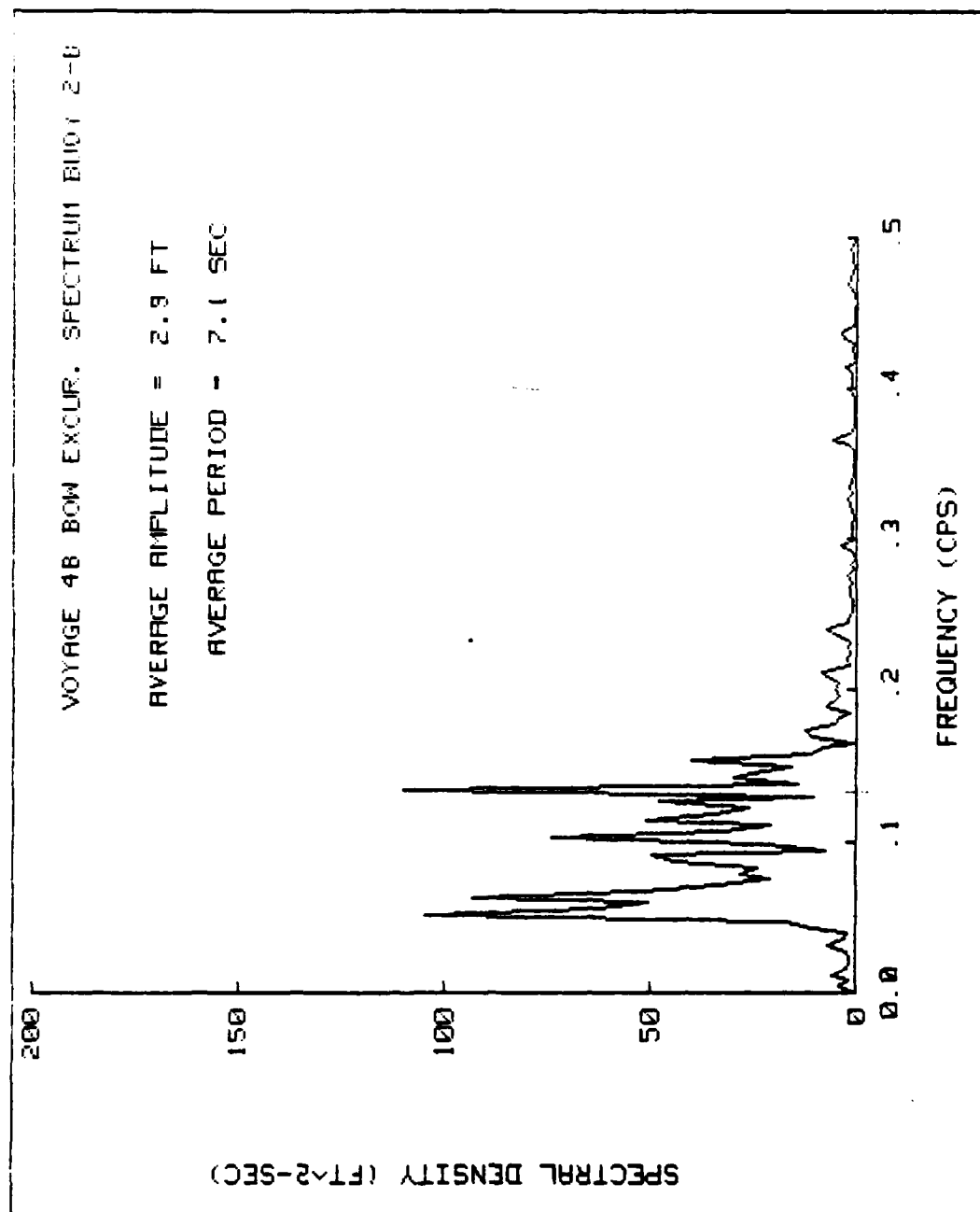


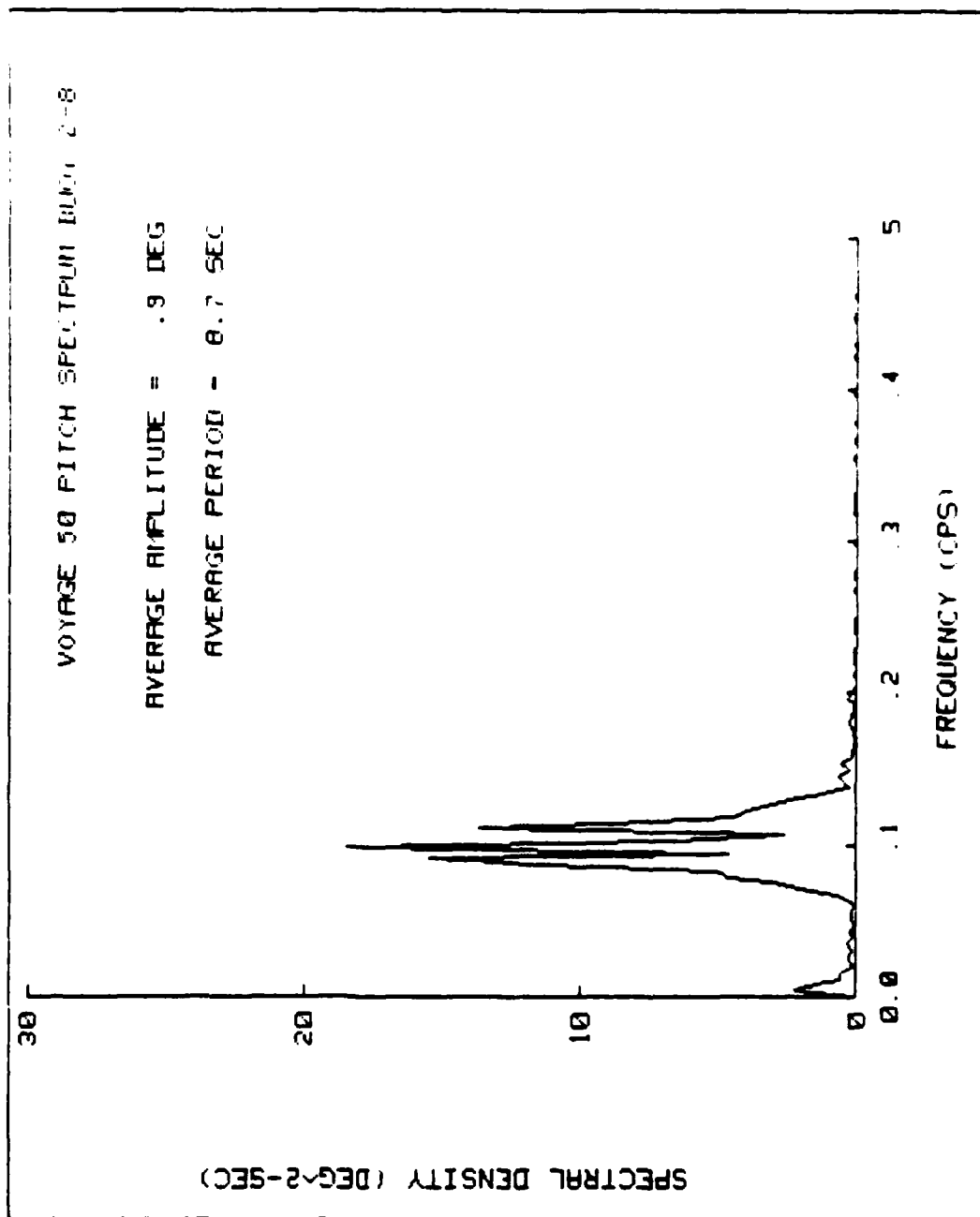
VOYAGE 48 ROLL SPECTRUM BUOY 2-8

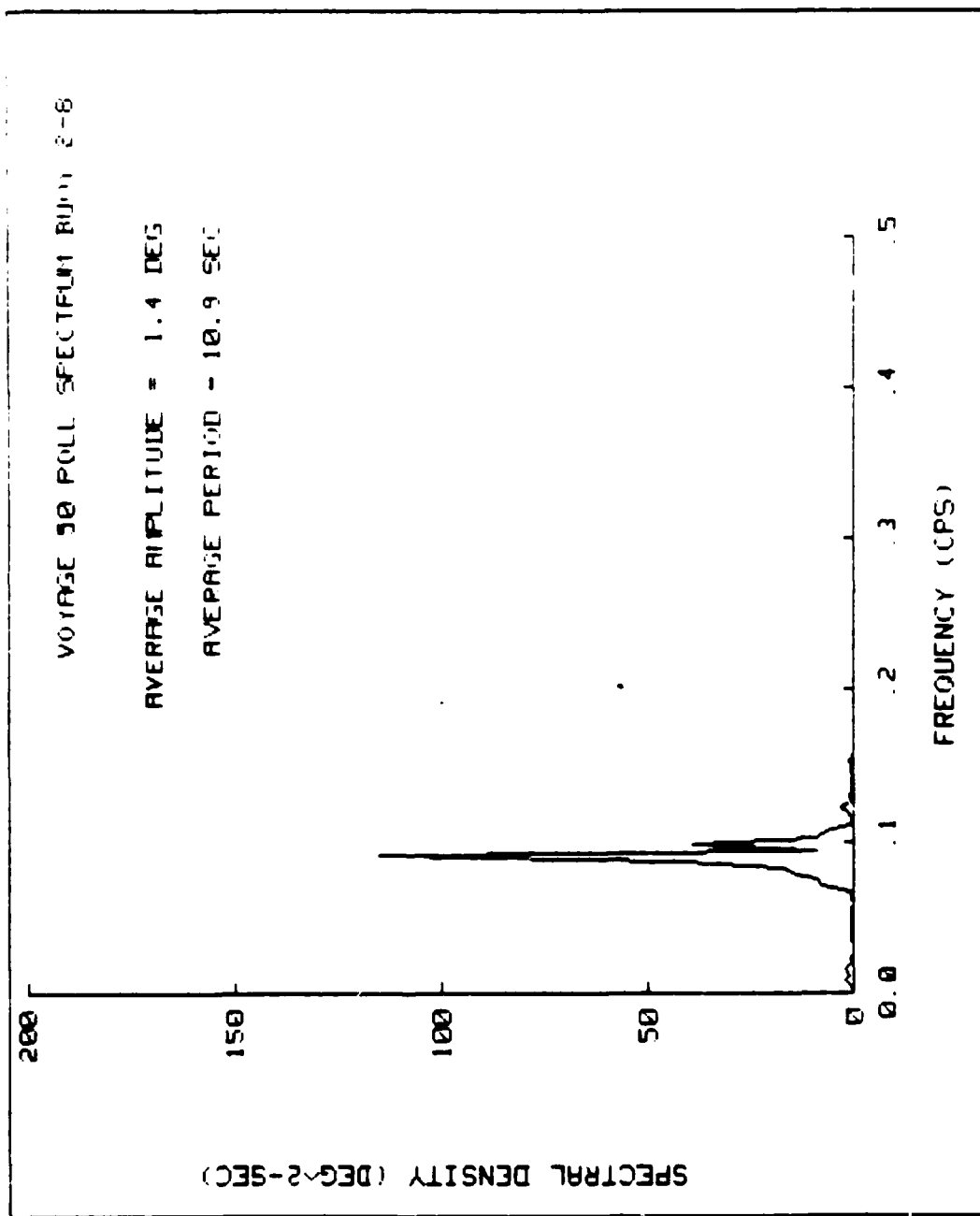
AVERAGE AMPLITUDE = 2.1 DEG

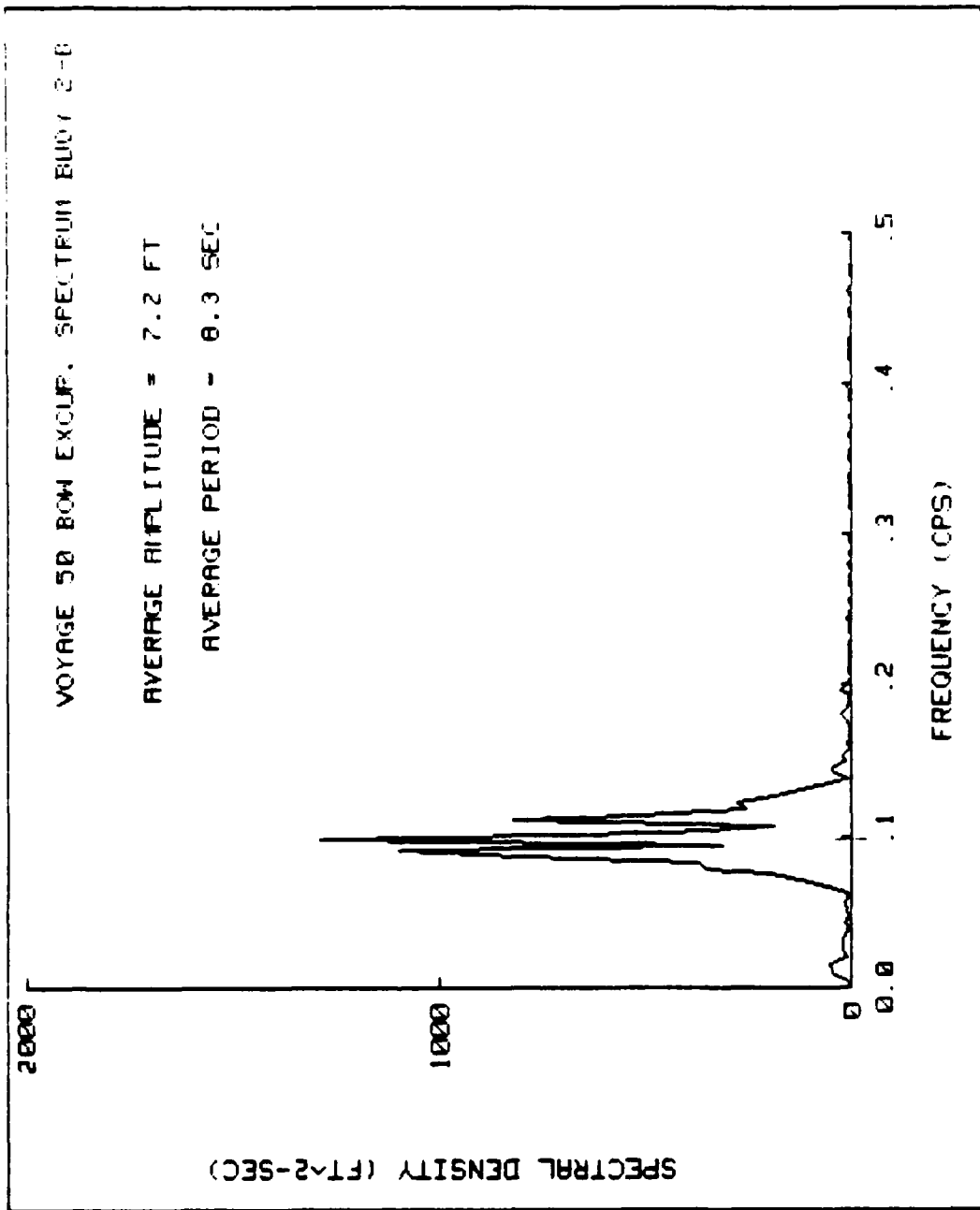
AVERAGE PERIOD = 14.2 SEC







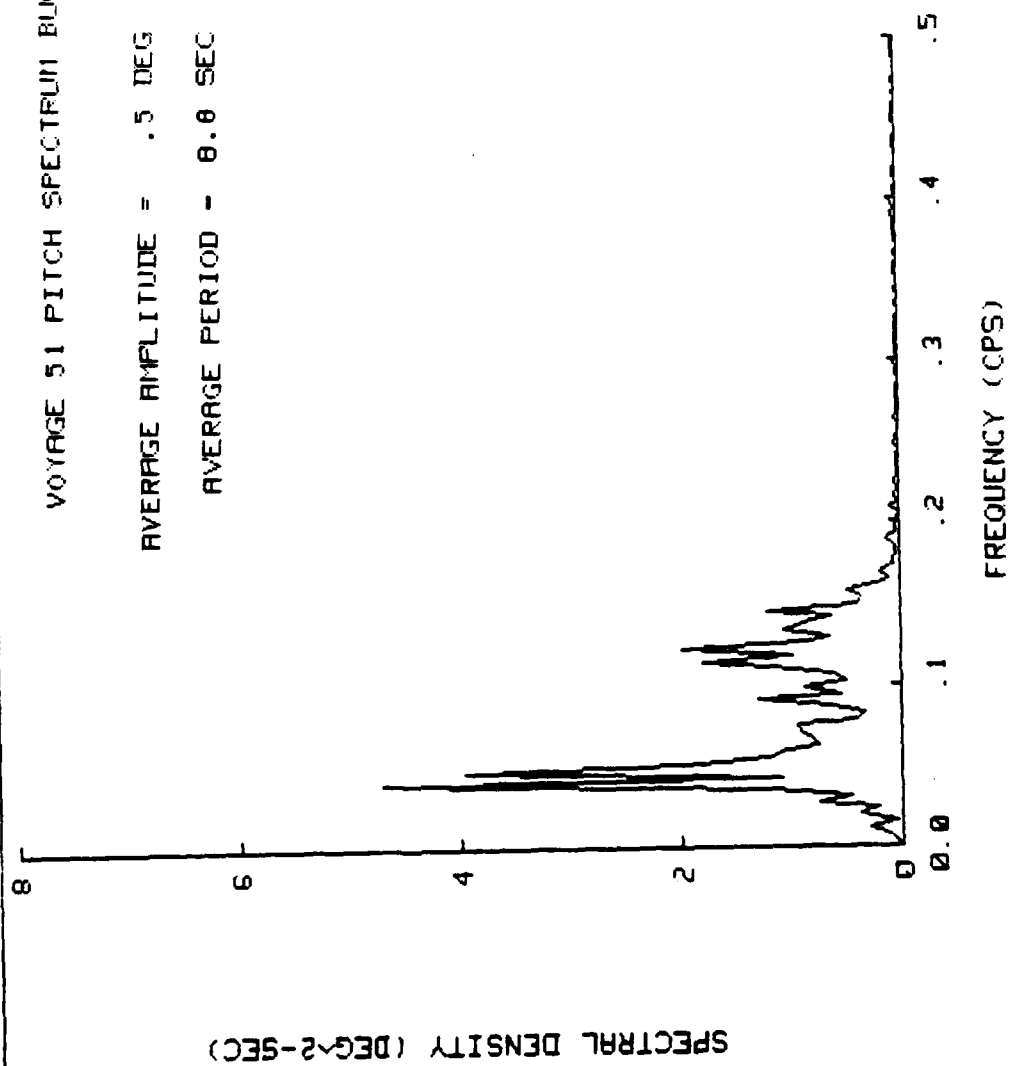




VOYAGE 51 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

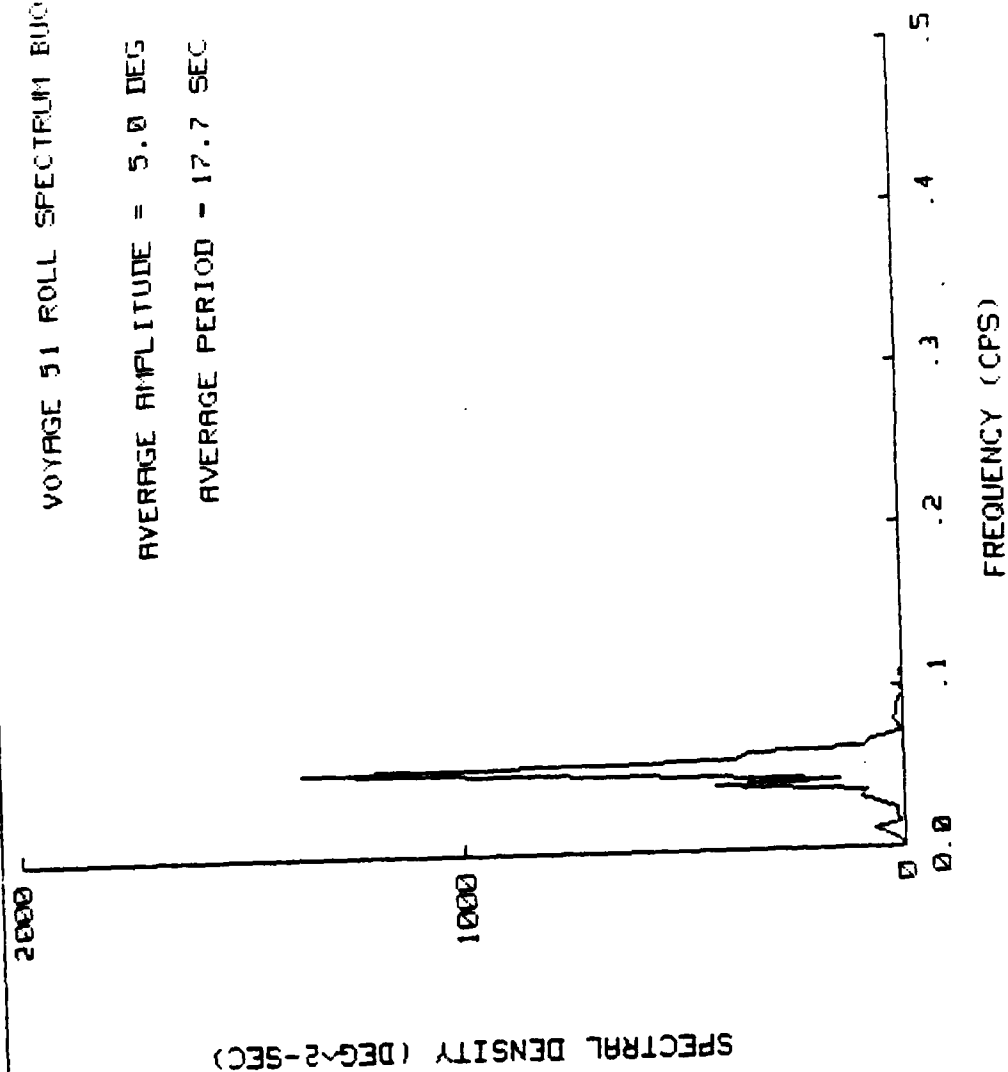
AVERAGE PERIOD = 8.0 SEC



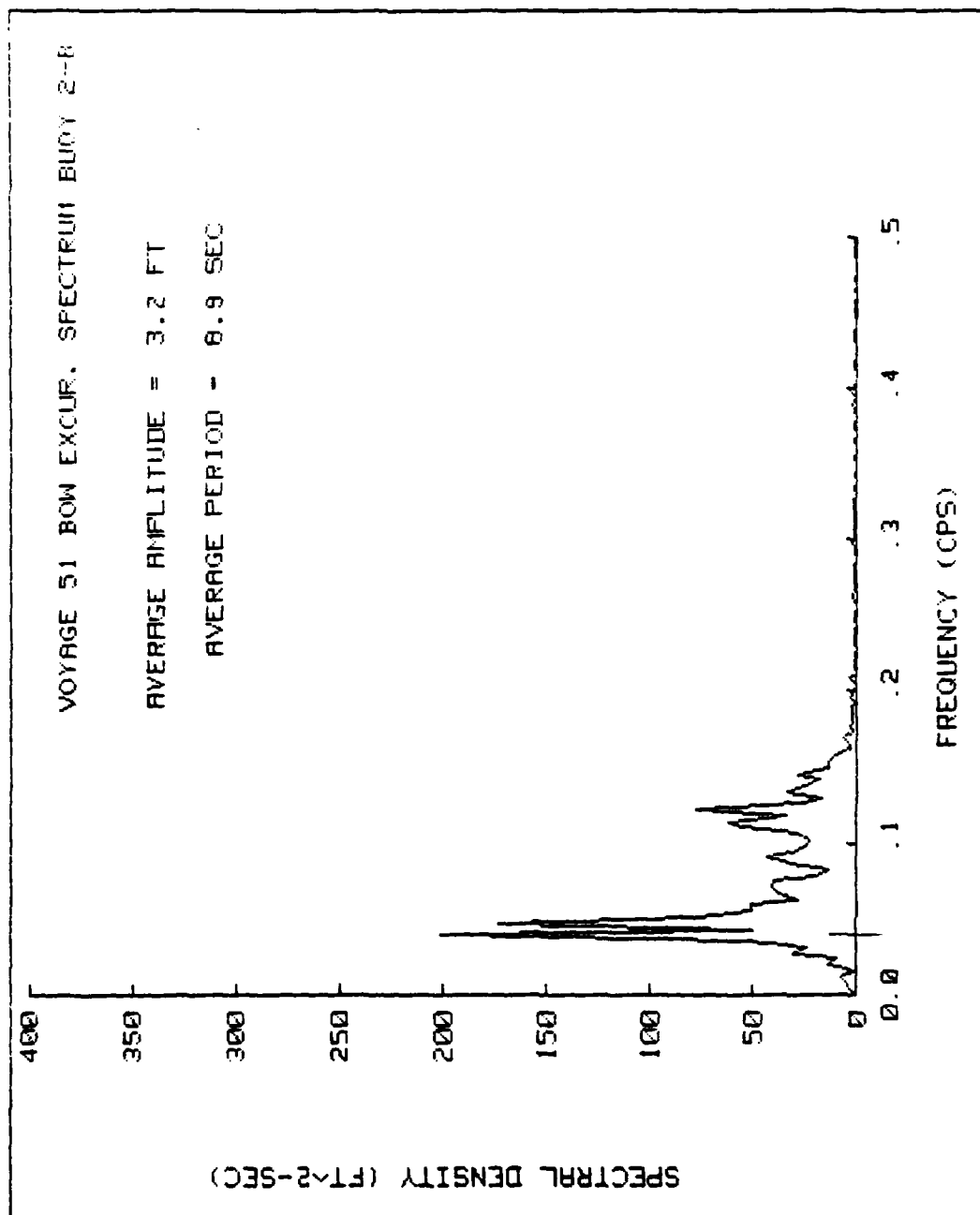
VOYAGE 51 ROLL SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = 5.0 DEG

AVERAGE PERIOD = 17.7 SEC



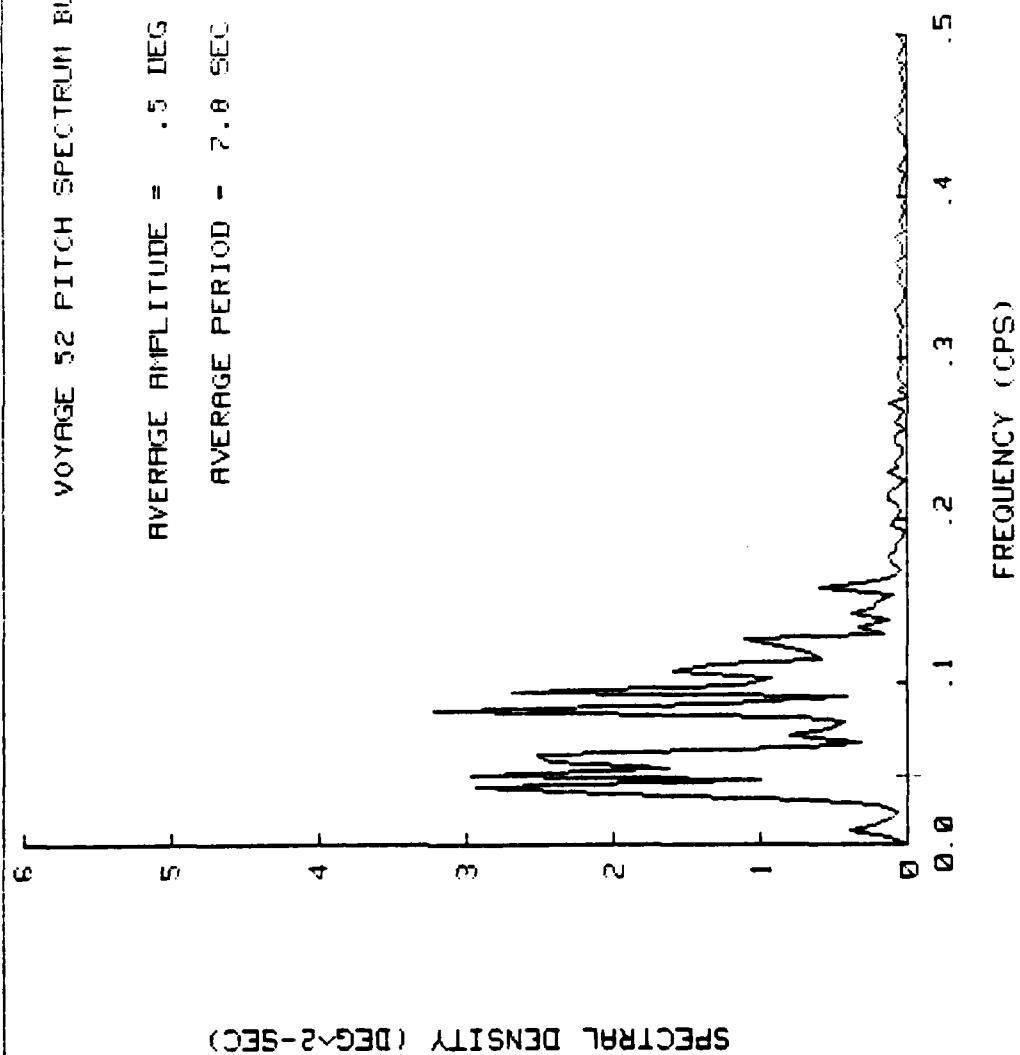


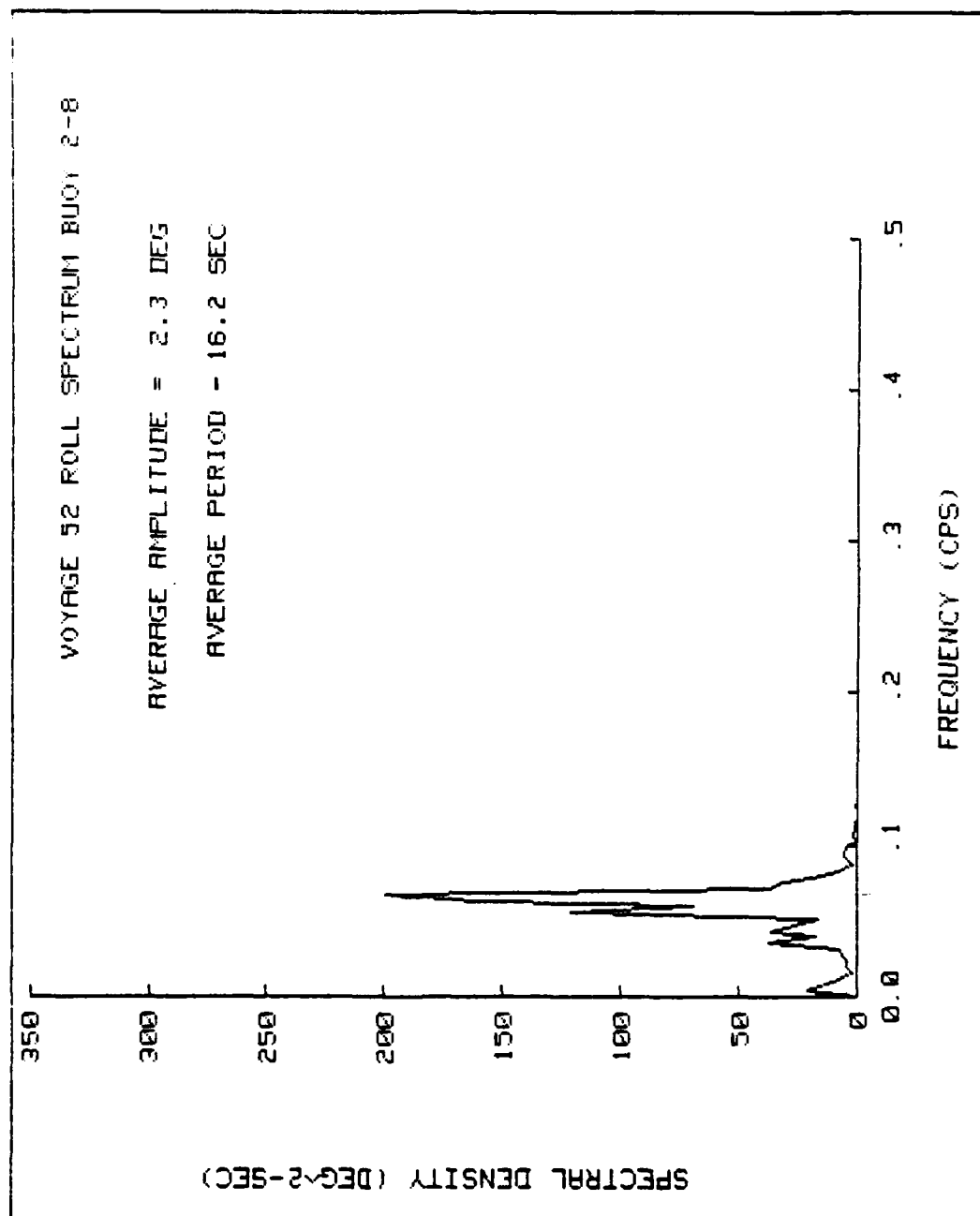


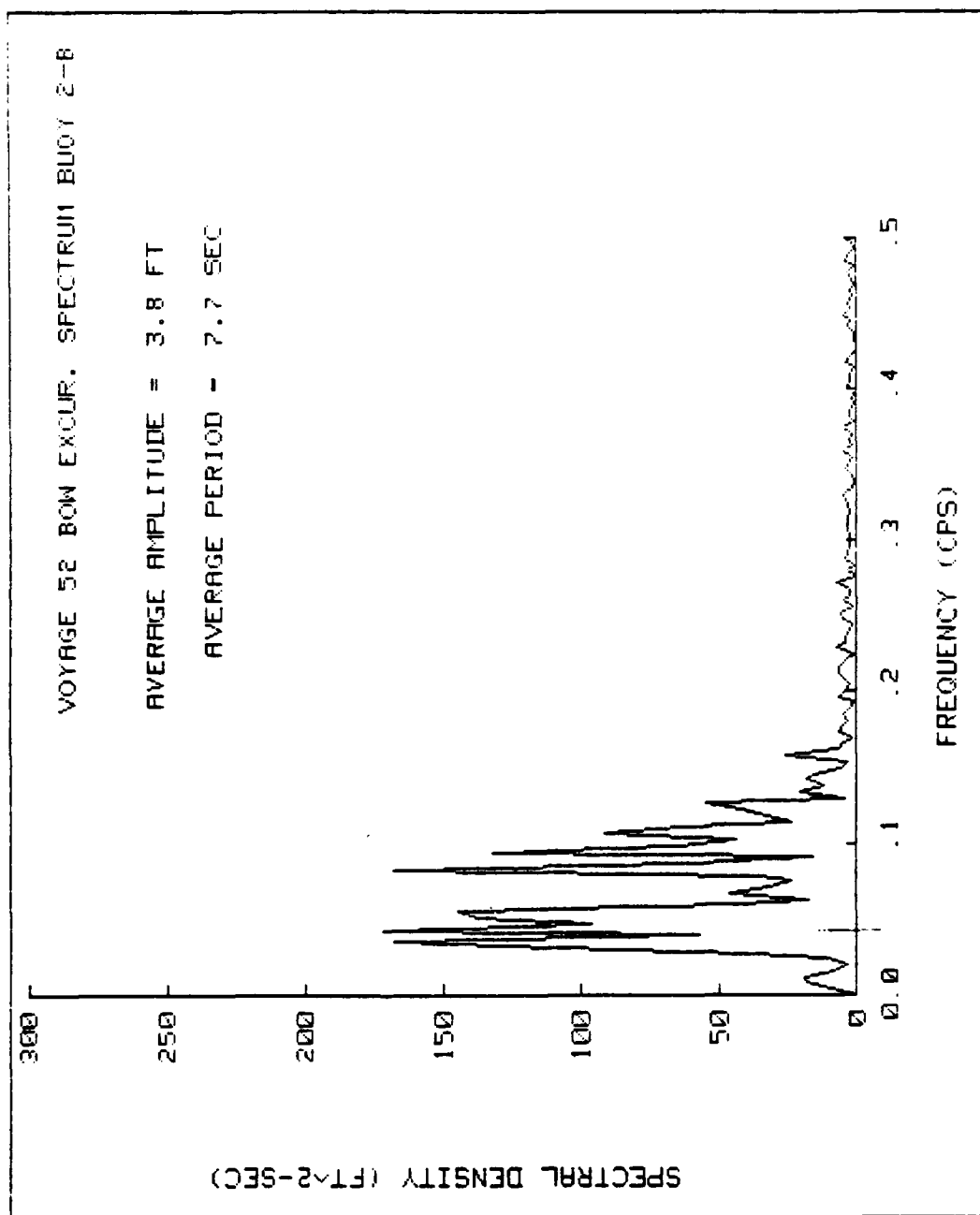
VOYAGE 52 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .5 DEG

AVERAGE PERIOD = 7.0 SEC



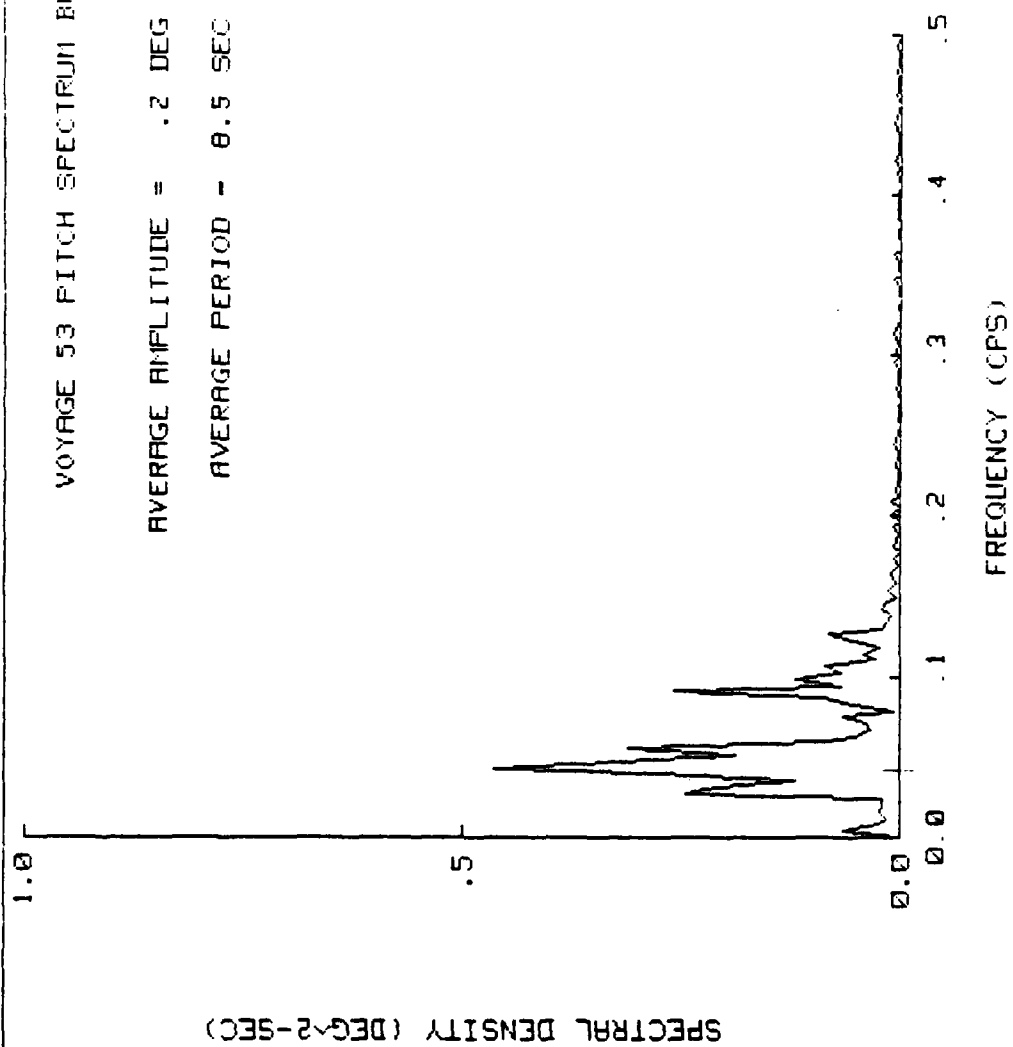


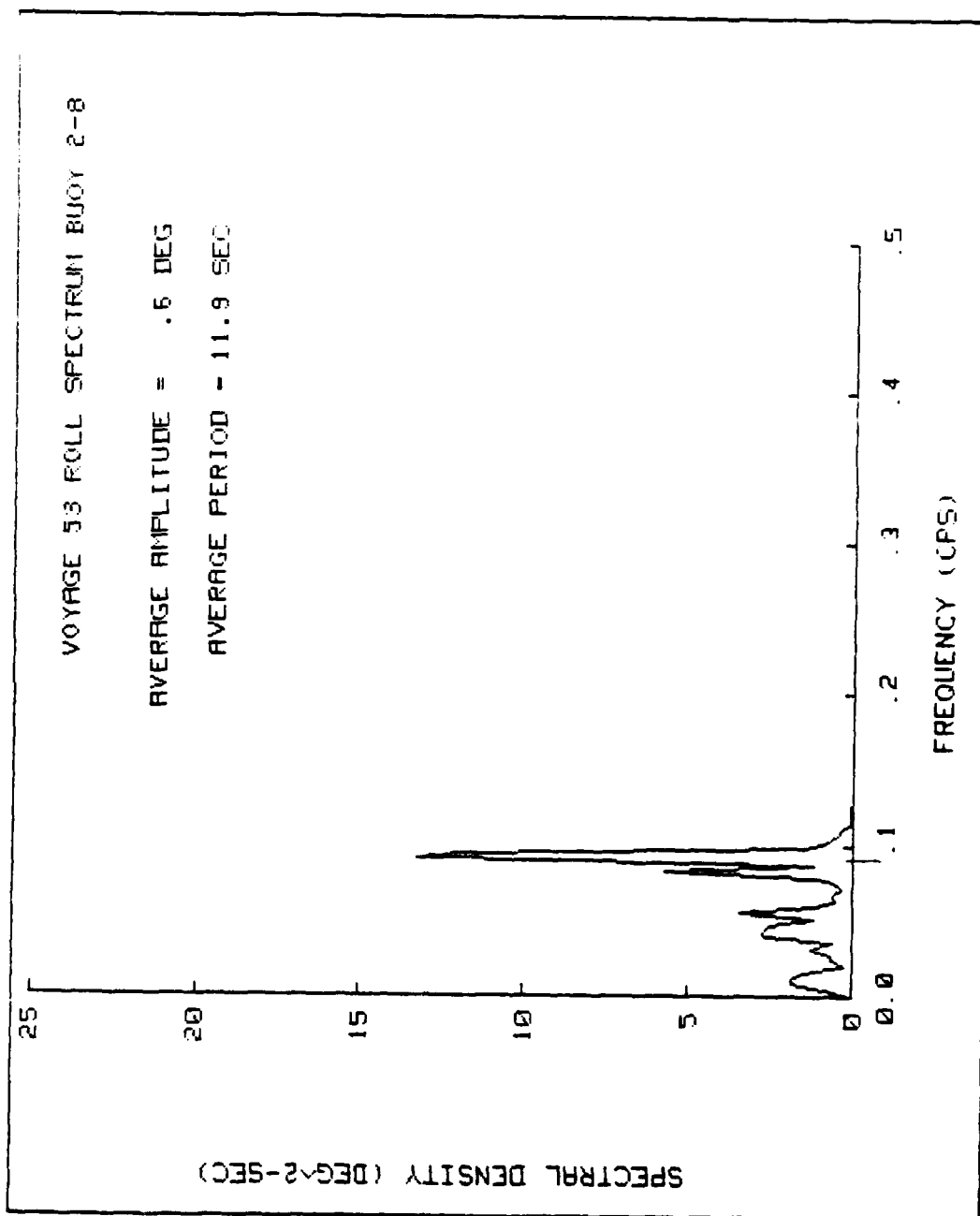


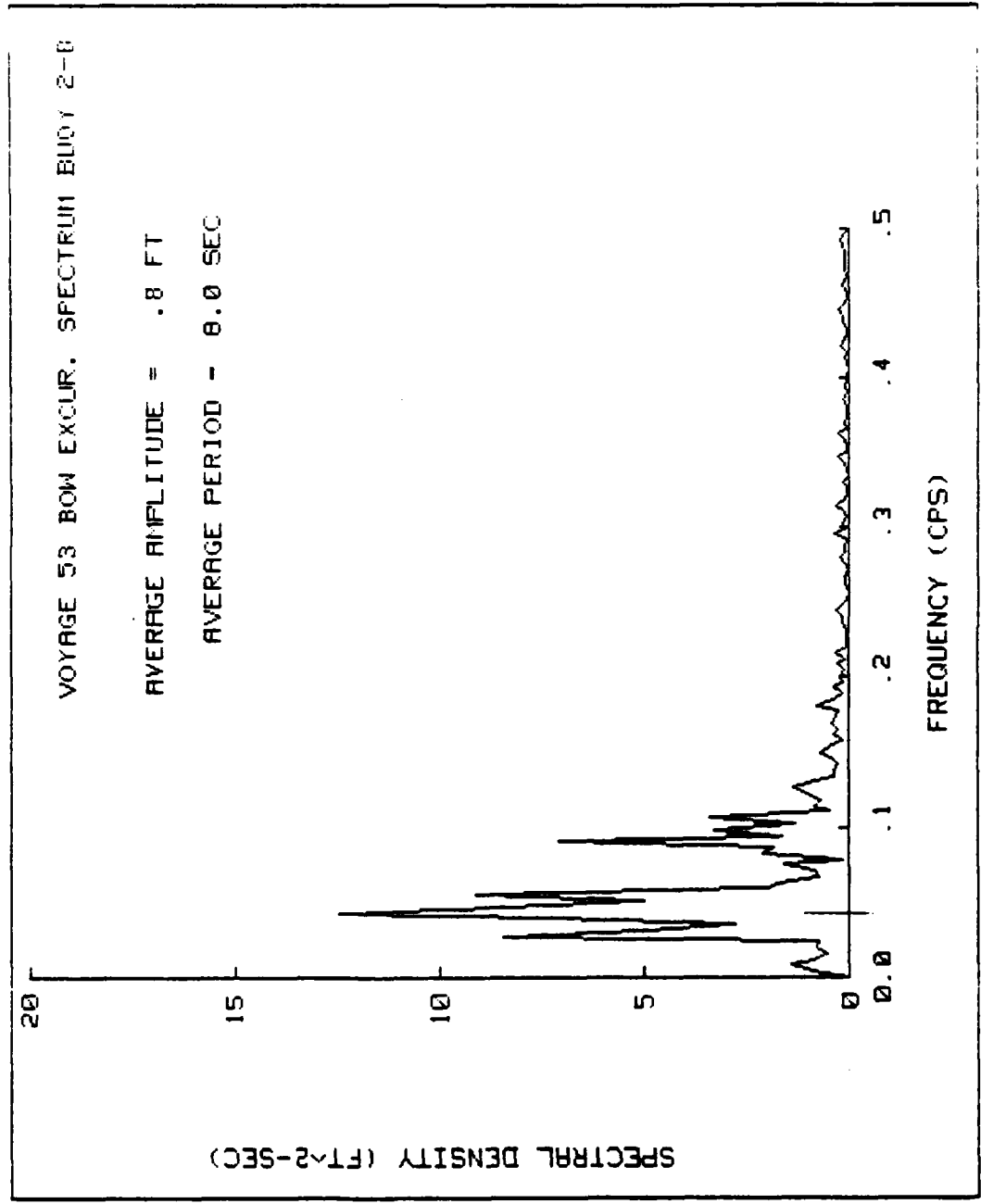
VOYAGE 53 PITCH SPECTRUM BUOY 2-8

AVERAGE AMPLITUDE = .2 DEG

AVERAGE PERIOD = 0.5 SEC







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